System 5000
Press Control

AUTO SETUP
MODULE
COLOR DISPLAY
OPERATING MANUAL

OmniLink 5000

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Section 1 Introduction

The 5000-10 Auto-Setup Module (ASM) allows the OmniLink 5000 Press and Automation control to set up press shut height, counterbalance air pressure, cushion air pressures, and hydraulic overload pressure settings automatically when jobs are recalled from memory. It consists of a base 5000-10 microprocessor board that installs in the OmniLink extended card rack, and additional modules that may be mounted on the base board to provide pressure or shut height adjustment functions. When one slide adjust is provided , up to four air systems and a hydraulic overload can be adjusted. For double action or banjo presses with two slide adjust systems, up to two air systems and a hydraulic overload can be adjusted.

Section 1.1 Counterbalance Control

The proper setup of the air counterbalance system in a press is often thought of as a relatively unimportant detail. In fact, the counterbalance performs a very critical function. By countering the weight of the slide and its associated tooling a properly adjusted counterbalance:

- Takes up bearing clearances before the die closes at the bottom of the stroke, reducing bearing load and impact.
- Helps reduce gear tooth impact in geared machines by maintaining drive edge gear tooth contact in the press downstroke.
- Decreases the downstroke stopping time of the press since less load is seen by the brake in the downstroke.
- Enhances safety by reducing the possibility that the slide will free fall, if the brake is released and the clutch is not engaged.
- Causes less total energy to be used by the press.
- Increases drive motor life by reducing peak motor currents.

None of the foregoing advantages will be realized if the counterbalance pressure is set too low. But a counterbalance pressure that is set too high is also detrimental to the press, causing excessive clutch wear and loss of flywheel energy in the downstroke before material is contacted by the dies.

By setting the pressure automatically when a job is recalled, the OmniLink 5000 assures that the pressure is correct for the tooling used. This not only reduces machine maintenance, but increases safety and speeds up job setup tremendously. In addition, the Auto-Setup module sets the correct pressure for each die, rather than an approximate pressure for a range of die weights from tables provided with manually adjustable counterbalance systems.

Section 1.2 Cushion Control

Quick die change is becoming increasingly important to maintaining a competitive edge. By controlling up to four cushions automatically, the OmniLink 5000 can shorten die change and assure a correct setup in the least amount of time.

Section 1.3 Shut Height Control

When a linear or rotary shut height control module is provided, the OmniLink 5000 can provide accurate, repeatable shut height adjustment on presses that are in reasonable mechanical condition, enhancing parts quality and reducing setup time. This system uses the existing slide motor starter.

Section 1.4 Hydraulic Overload Control

Most presses use a hydraulic overload system in which an air pressure sets up a much greater hydraulic pressure to control the trip point (tonnage) at which the overload cylinder collapses. On these presses the OmniLink 5000 can control the trip point to not only protect the machine, but also protect the tooling on each job.

Section 2 Parameter Entry and Access Control

Section 2.1 Parameter Entry

Throughout the OmniLink control, a fairly standard form of data entry is employed. When data entry is allowed, an "editing cursor" will appear on the screen. This cursor can typically be moved from parameter to parameter on the screen with the up, down, left, and right arrow keys. The topmost softkey is used to select the parameter for editing and can change description depending on the parameter selected.

Section 2.1.1 Numeric Entries

Assuming access has been achieved by one of the means listed in the following sections, to change a numeric value:

a) Place the editing cursor on the parameter to be changed by using the up, down, left, and right arrow keys as appropriate. Note that the editing cursor will only appear on the screen when editing is allowed. For instance, editing is usually not allowed when the press is running.

b) The topmost softkey will usually say something along the lines of "CHANGE XXXXXX" where XXXXXX is the name of the value to be changed. It may also simply say "CHANGE NUMBER." In any case, hit this softkey to enter numeric input mode. The editing cursor will change to a rectangle around the parameter to be edited.

c) Use the numeric keypad to input the new number desired for the parameter.

d) Press the ENT key to finish.

Note that moving off the parameter with the arrow keys or hitting the EXIT key will abort the edit and leave the parameter at the value it had before the editing process began.

Section 2.1.2 Text Entry

For text entry:

a) Place the editing cursor on the text to be changed by using the up, down, left, and right arrow keys as appropriate. Note that the editing cursor will only appear on the screen when editing is allowed. For instance, editing is usually not allowed when the press is running.

b) The topmost softkey will usually say something along the lines of "CHANGE XXXXXX" where XXXXXX is the name of the value to be changed. It may also simply say "CHANGE TEXT" or "CHANGE DESC." In any case, hit this softkey to enter text entry mode. The right-hand softkeys will change, a letter selection box will appear, and the editing cursor will change to a rectangle around the text to be edited. Figure 2.1 shows the softkeys and an example text parameter.

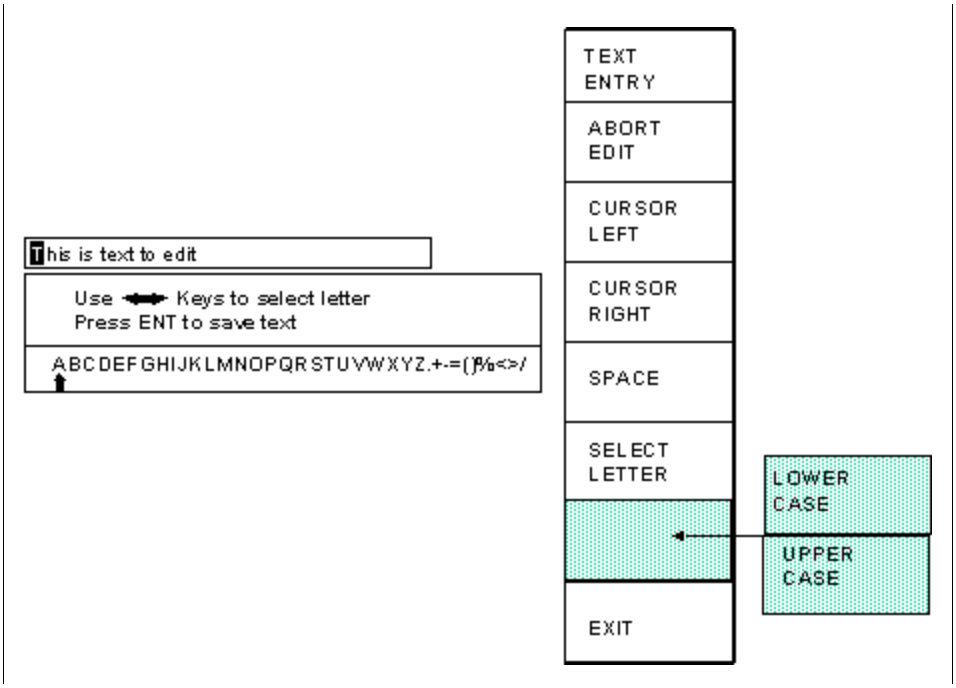


Figure 2.1: Example Text Entry

c) The fist character of the text is highlighted with the text cursor. The CURSOR LEFT and CURSOR RIGHT softkeys will move this cursor.

d) Use the left and right arrow keys to point to the letter desired in the letter box next to the text being edited. This box will just appear above or just below the text to be edited depending on where it is in the screen. Hit the SELECT LETTER softkey to place that letter at the text cursor. In the example above, the text cursor is on the "T" in "This" and would be replaced with an "A". The text cursor will automatically move to the right when a letter is selected. Note that numerals can be entered directly with the numeric keypad.

e) The SPACE softkey can be used to enter a space character in the text.

f) The softkey immediately above the EXIT softkey is used to select between uppercase and lowercase letters.

g) The EXIT or ABORT EDIT softkeys can be used to abort the editing operation. The text will revert to what it was before the editing operation started.

h) After the text has been changed as desired, press the ENT key to accept the changes.

Section 2.2 Access Control

The OmniLink control has several parameters or operations that have limited access. In regards to the auto setup module the ability to perform the actions of resetting faults or changing limits must be restricted to certain personnel. The OmniLink control provides several means to limit access to these parameters or operations. These parameters and operations are called restricted items.

The OmniLink control employs combinations of two different means to limit access to restricted items. These means are the RUN/PROG key switch on the operator terminal and a user password system. The user password system assigns names and passwords to up to sixteen users. These two means can be used alone or in combination with each other. When a user employs the proper means to gain access, he will have the ability to perform the actions and change the parameters which have been designated to his control.

There are four possible modes of operation for the restricted access system. They are the "Key Only" mode, the "Key or Password" mode, the "Password Only" mode, and the "Key and Password" mode. The control can be configured to operate in any one of these four modes.

Section 2.2.1 Key Only Mode

The "Key Only" mode is the least complex of the four modes. This mode employs the RUN/PROG key as the only means to limit access to restricted items. Any user with the RUN/PROG key can access all of the restricted items. Without the RUN/PROG key, user access to all of the restricted items is prohibited.

Although the "Key Only" mode has the advantage of being easy to use, it does have a disadvantage. This mode cannot give a particular user access to only some of the restricted items. When operating in this mode, any user with the RUN/PROG key will have access to all of the restricted items.

Section 2.2.2 Key or Password Mode

The key or password mode allows for either of two means to gain access to the restricted items. A user with RUN/PROG key can access all of the restricted items. A user with the correct password can access the restricted items that have been designated for that particular user only. The system allows for passwords to be assigned to sixteen users. Each user can be assigned access to any or all of the restricted items.

The following is an example of a "Key or Password" mode operation. The RUN/PROG key is given to the die set-up personnel. A press operator is assigned a user name and password. With the password the operator can reset auto setup faults. This is the only auto setup related item to which the operator has access. In order to load a die, the set-up personnel uses the RUN/PROG key to recall a job from job storage. The set-up personnel will also be able to make changes to auto setup limits. Once the set-up personnel sets the die and verifies its correct operation, the operator is left to run the die. If an auto setup fault occurs, the operator can enter the correct password and then reset the fault. However, the operator cannot change auto setup limits. This will allow the operator to keep running the job and reset faults that occur. However, if consistent stops occur because an auto setup limit needs changing, the set-up personnel must be called to change the limit.

The example above can be taken one additional step if two press operators are given different user names and different passwords. One operator can be assigned the ability to change auto setup limits in addition to the ability to reset faults, while the other operator is not assigned the ability to change the limits.

Section 2.2.3 Password Only Mode

The "Password Only" mode allows for sixteen users. Each user can be assigned access to some or all of the restricted items. This mode does not use the RUN/PROG key.

The example listed above indicated that setup personnel required access to all restricted items. In the "Key or Password" mode, the setup personnel used the RUN/PROG key to gain access to all of the restricted items. In the "Password Only" mode, the setup personnel can still have access to all of the restricted items, but the system must be configured as such. The setup personnel must be assigned a user name and password. In addition, all restricted items would be assigned access to the setup personnel.

Section 2.2.4 Key and Password Mode

The "Key and Password" mode requires the user to have the RUN/PROG key, user name, and user password. Operation is basically the same as the Password only mode, except that in addition to entering the password the user must switch the RUN/PROG key to the PROG position.

Section 2.2.5 Restricted Items

The following table lists the auto setup module restricted items name and function.

AUTO SETUP MODULE RESTRICTED ITEMS

NAME	FUNCTION
Auto Setup Reset	Reset Auto Setup Faults
Auto Setup Settings	Change Auto Setup Settings (Pressures, Slide Setpoints, etc.)

Section 2.2.6 Access Control Operation

To gain access control the user must use one of two means or a combination of these two means. These means are the RUN/PROG key or the user password system.

Section 2.2.6.1 RUN/PROG Key Switch Operation

The RUN/PROG key switch is located on the lower right side of the operator terminal. This is a two position switch. The key is removable in the RUN position only. If the RUN/PROG key switch is being used as a means to access the restricted items, the switch must be turned to the PROG position. When the RUN/PROG key switch is switched to the PROG position, the press will Top Stop and stroking will be prohibited until the switch is returned to the RUN position.

When operating in the Key Only mode the key switch is the only means available to access the restricted items. All restricted items are accessible when the RUN/PROG key switch is switched to the PROG position.

When operating in the "Key or Password" mode, the key switch is one of the means available to access the restricted items. All restricted items are accessible when the RUN/PROG key switch is switched to the PROG position.

When operating in the "Key and Password" mode, the key switch and password must be used to access the restricted items. In this mode, the user will be granted access only to the restricted items that have been assigned to him.

Section 2.2.6.2 Password System Operation

Figure 2.2 displays a typical password entry sequence. This example shows the steps necessary to change a slide adjust setpoint. This is typical for password entry for all restricted items.

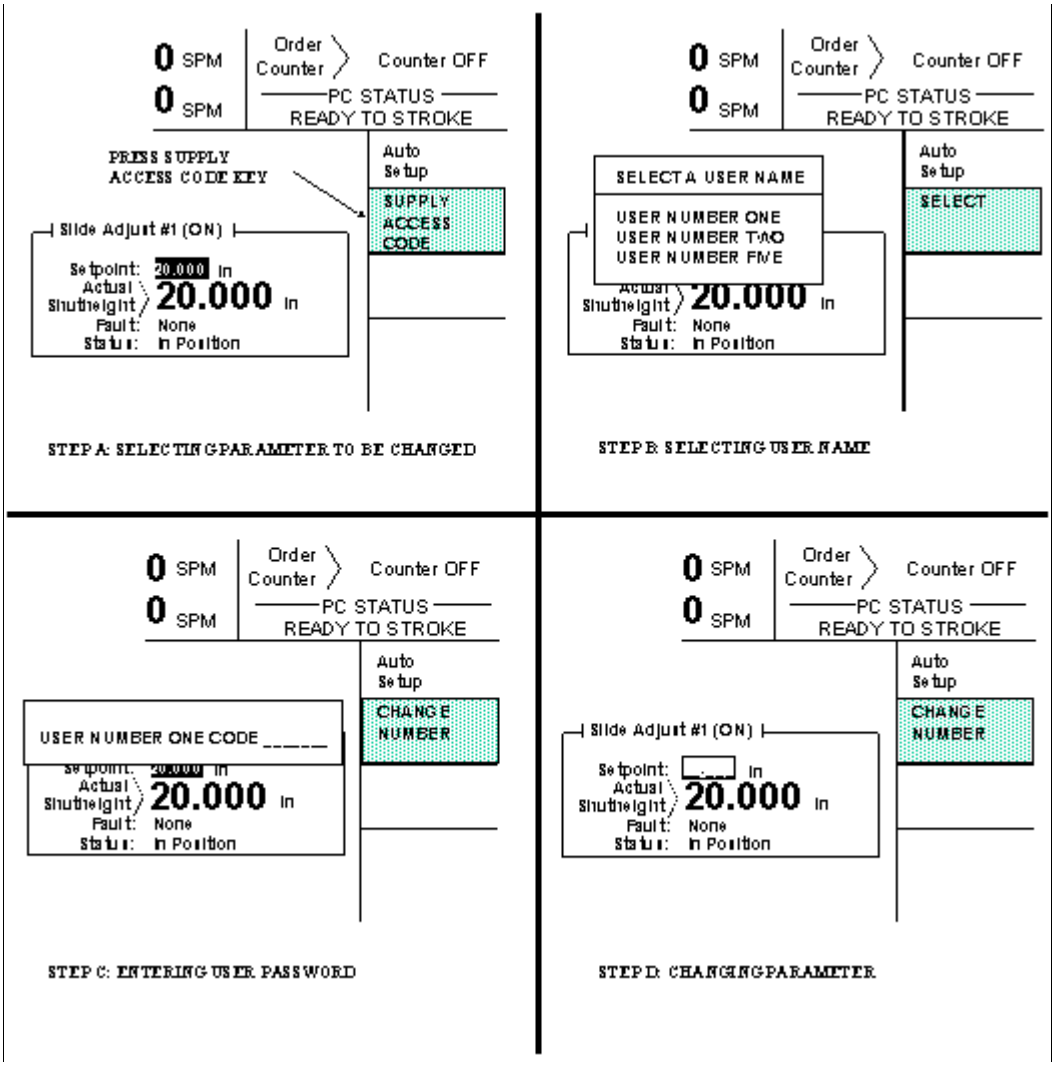


Figure 2.2: Example Password Entry Sequence

Step A: Select the restricted item. In the example shown in Figure 2.2 the restricted item is Slide Adjust #1 setpoint. Once the parameter is selected then Softkey # 1, the upper vertical softkey (Softkey # 1 is highlighted in Figure 2.2) , will display the legend "SELECT".

Step B: A list of users that have access to this restricted item will appear. In the example shown in Figure 2.2 only User Number One, User Number Two, and User Number Five have access to this restricted parameter. The system may have several more users, but the three users listed on the screen are the only users that have access to change an Auto Setup Setting . The user must use the arrow keys to position the cursor on his user name. After placing the cursor on the correct name, the user must press the SELECT softkey. The SELECT softkey must be pressed even if there is only one user name displayed.

Step C: The display will show the selected user name and request the user password. The user must enter the correct password and then press the ENT key.

Step D: Upon entry of the correct password, the user will be allowed access to the restricted item. In the example shown in Figure 2.2, the user will have access to change the Slide Adjust #1 setpoint.

After performing the steps listed above, the user will be logged in to the password system. The user will have access to all restricted items that have been designated for his access. This access will remain until the user performs a log out or until the user is automatically logged out.

The user can log out by using the ACC key. This key will directly switch the display to the Quick Access screen. The "LOGOUT" soft key legend will appear along the bottom of the screen. If the operator presses this key, he will log out. He will no longer have access to the restricted items, unless he repeats steps A through D.

In addition to the manual log out, the system contains an automatic logout. The intent of automatic log out is to reduce the possibility of users other than the intended user having access to restricted items. If there were no provisions for automatic log out and a user forgot to manually log out, all restricted items to which the user had been designated for access would be available from the log in time until power was removed from the OmniLink control. This presents the possibility of users other than the intended user having access to restricted items. Automatic log out is based upon both time and press strokes. During system configuration automatic Access Timeout parameters are entered. An automatic access timeout time and automatic access timeout strokes are entered. The time entered is the amount of time after the last key stroke that will be allowed before the system will automatically log out the user. For example, if the automatic access timeout is set to 60 seconds, the user will be logged out 60 seconds after the last key stroke. If the user presses a key before the 60 seconds have elapsed, a new 60 second cycle will be started. The number of strokes that are entered is the number of press strokes after the last key stroke that will be allowed before the system automatically logs out the user. For example, if the automatic timeout is set to 10 strokes, the user will be logged out when the press completes ten strokes after the last key stroke. If the user presses a key before 10 strokes have been completed, a new 10 stroke cycle will be started.

Section 3. Installation

Section 3.1 Auto-Setup Module Installation

The 5000-10 Auto-Setup Module (ASM) installs in the OmniLink 5000 extended card rack. Figure 3.1 shows the location of the ASM in the last slot of the extended card rack. To remove the module, loosen the knurled screws at the top and bottom of the board and use them to pull the board straight out of the rack. To install, start the module in the card guide slots on the rack, push straight into the rack to firmly seat the module, and tighten the knurled screws.

NOTE:	**NEVER** remove or install any card in the OmniLink 5000 when the power to the control is on. Doing so can damage the control, the card, or both!

The face plate of the ASM is partitioned with labels such as “SS1", “AS1", etc. These labels represent the type of module that can be installed on the card at that location. “SS1" and “SS2" can have slide adjust modules installed. “AS1" through “AS4" can have air adjust modules (counterbalance and cushion use the same control module) installed. Slide adjust cards are twice the width of air adjust cards. Note that SS2 overlaps with AS1 and AS2 to allow a second slide adjust card to be installed in a double action press at the expense of two air slots. “AS7" is used for hydraulic overload control and is built in to the base card.

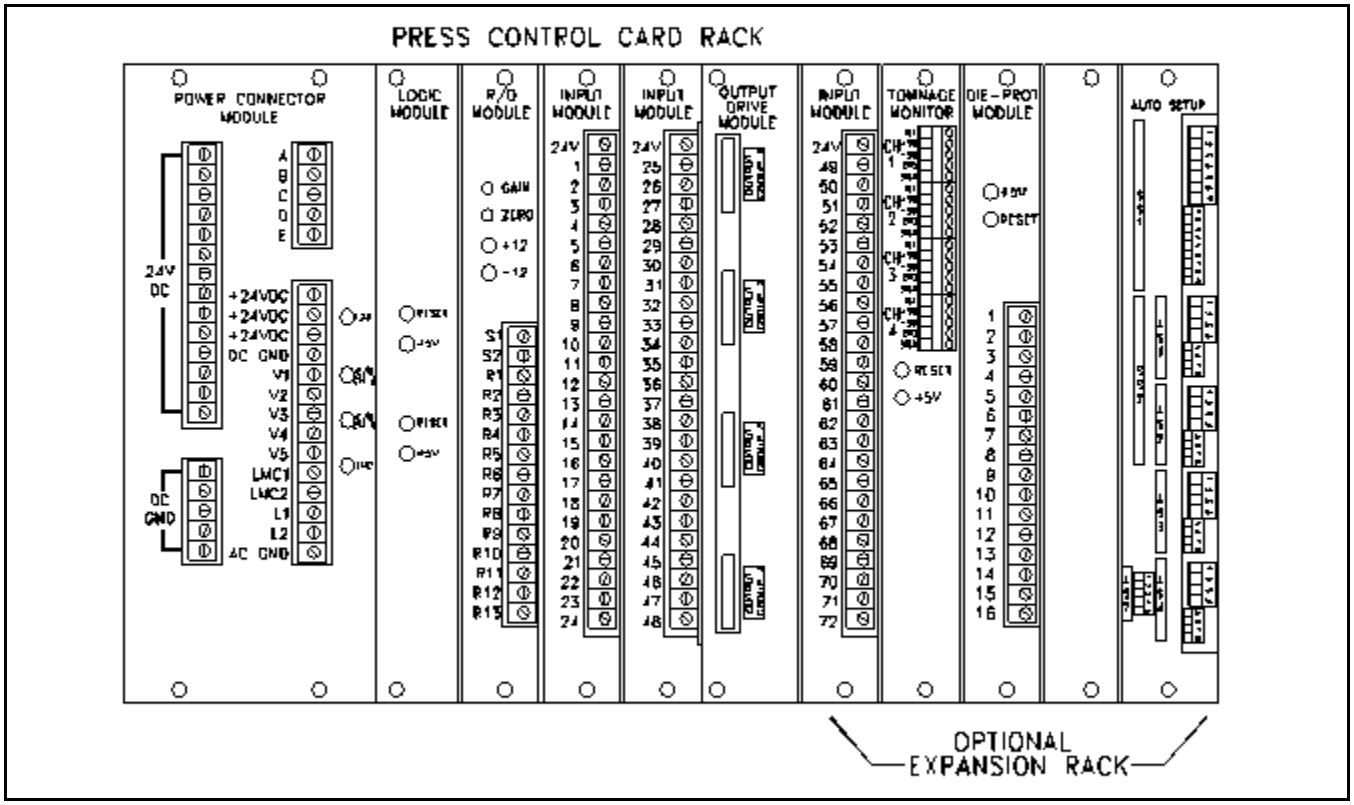


Figure 3.1: OmniLink 5000 Extended Card Rack

Each module is held on to the base card by four #6-32 screws. If not already assembled, install each module on the base card putting slide adjust cards in SS1 or SS2 and air adjust cards in AS1, AS2, AS3,

or AS4. The plug in terminals on the modules should stick out of the faceplate of the base card.

Section 3.2 Valve Systems

Counterbalance and cushion systems are very similar in the way they are controlled. Three basic integrated valve configurations are available from Link to be used with the OmniLink 5000 ASM. For clarity in the following sections, these valve configurations are defined here.

Type "A" An integrated Fill/Dump Valve as shown in Figure 3.2. This valve has the advantage of simple straight through piping with all pilot pressures run internally and is easily mounted. It may be used for air cushion and air counterbalance control. This is the least expensive of the three valves. Leaks in cushion and counterbalance systems will cause loss of pressure in these systems when either control power is off or supply pressure is absent. However, the control must be turned back on and pressure re-established before the press will stroke.

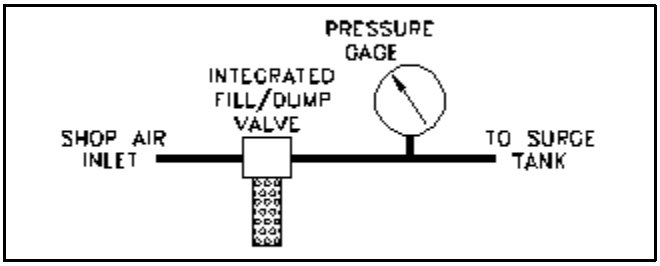


Figure 3.2: Type "A" Valve Configuration

Type "B" An integrated Fill/Dump valve with a manual regulator, check valve, and LOX valve in parallel as shown in Figure 3.3 for cushion, but not counterbalance, adjustment. This valve adds a parallel manual regulator system to the Type "A" valve, which may be set to prevent the air pressure in the cushion from going below a **minimum** value set by the manual regulator (as long as there is shop air pressure). This prevents cushion drift down when control power is off with its associated lost die pins below the press bolster and lost time while they are recovered. This valve also allows the cushions to be adjusted using the manual regulator path if the automatic system fails, allowing the press to be operated until the automatic system is restored. When the automatic system is on, the manual regulator on this valve system **must not** be set higher than the lowest pressure that the automatic system is to provide, because the automatic valves will try to dump while the manual regulator fills if the automatic setpoint is lower than the manual regulator pressure.

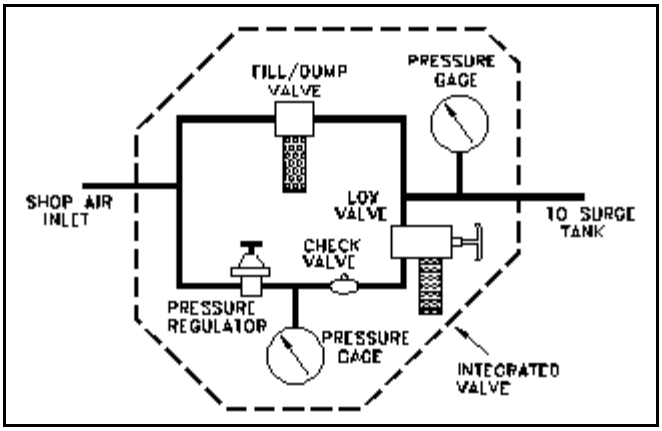


Figure 3.3: Type "B" Valve Configuration

Type "C" An integrated Fill/Dump valve with a manual regulator, check valve, and LOX valve, and a four-way valve that selects whether the pressure is set by the automatic system or the manual regulator as shown in Figure 3.4 for cushion and counterbalance adjustment. Unlike the type "B" valve, the manual regulator can be set to any allowable pressure without interfering with automatic pressure adjustment- it does not have to be a minimum pressure. This system is ideal for press counterbalance systems as the manual regulator can be set to balance the heaviest die used on the press. When the OmniLink 5000 control is powered off, the valve automatically reverts to at least the pressure set by the manual regulator. If there is an air leak in the counterbalance system, the manual regulator keeps the system charged to support the weight of the die.

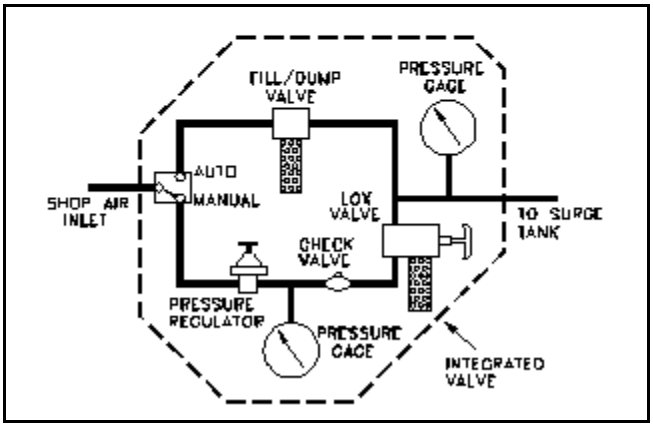


Figure 3.4: Type "C" Valve Configuration

Section 3.3 Counterbalance Control Installation

The automatic counterbalance control system consists of an air control module mounted on the ASM, a control valve (or valves) , and a pressure transducer. The typical manually controlled press counterbalance system looks something like Figure 3.5.

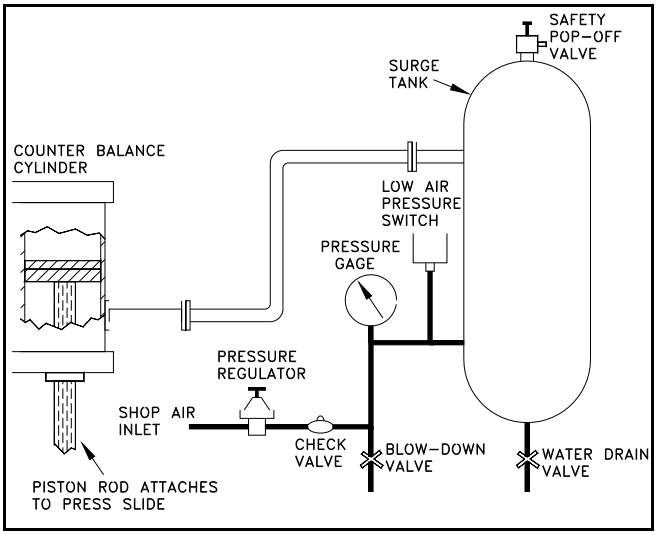
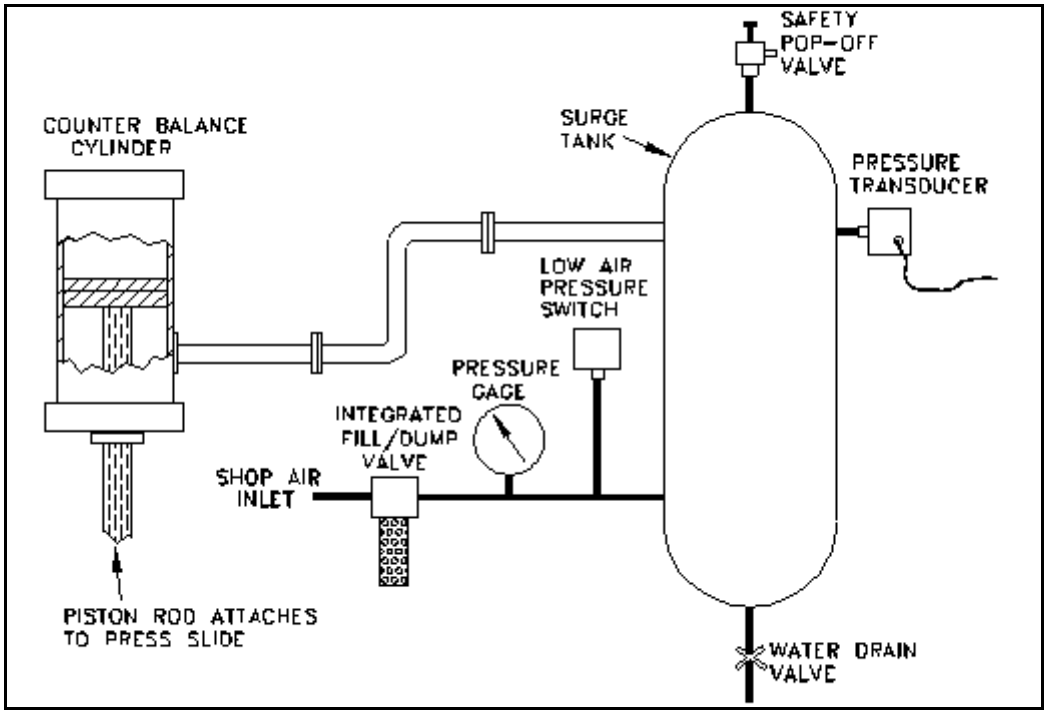


Figure 3.5: Typical Counterbalance System

For automatic control, the pressure regulator and check valve are replaced with an air valve system. Figures 3.6 and 3.7 illustrate systems using the Type "A" and Type "C" valves described in section 3.2. In all cases a pressure transducer is used to monitor the air pressure.



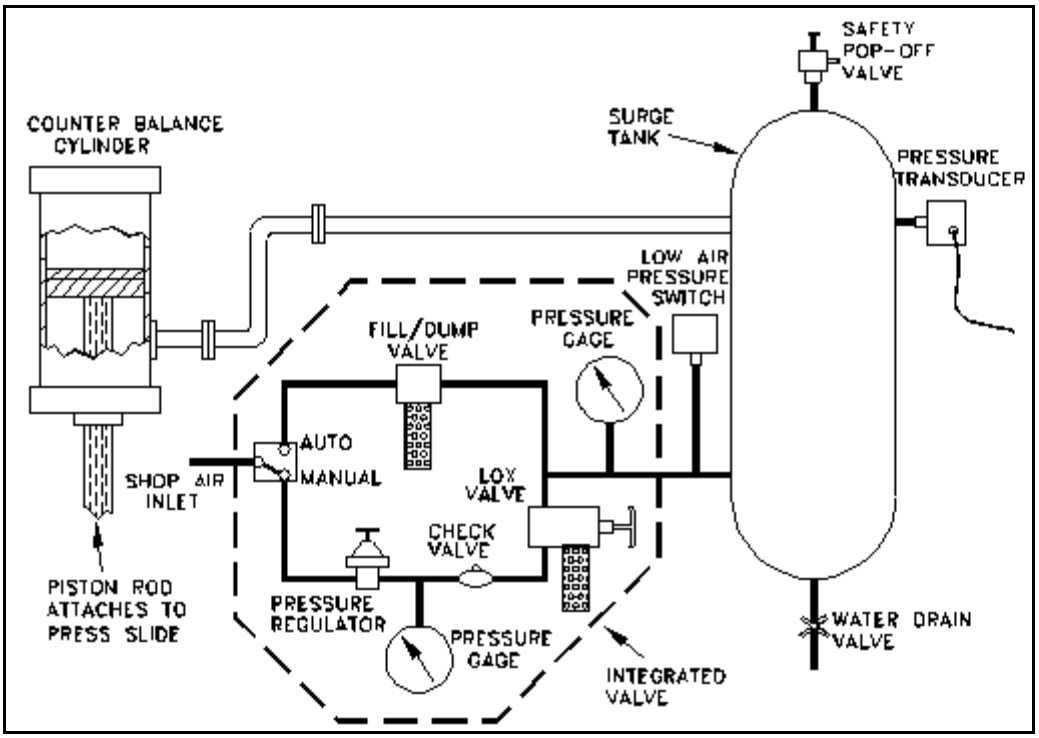


Figure 3.7: Auto-Counterbalance with Type "C" Integrated Valve.

Section 3.3.1 Counterbalance Pressure Transducer Mounting

The system uses an automatic method of control in which the fill valve or dump valve is energized to raise or lower the pressure of the system and a pressure transducer is used to "tell" the ASM what pressure is in the system. The pressure transducer is constantly monitored to verify that the system is at the proper pressure. When filling or dumping air into or out of the counterbalance, the transducer tells the system when to stop. Because air pressure drops occur across air lines when filling or dumping, proper placement of the pressure transducer is very important for correct operation of the system. Possible pressure transducer mounting locations from best to worst are (refer to Figure 3.8):

a) A spare port on the counterbalance surge tank.

b) The same port that the safety pop-off valve is mounted on if it has its own port on the surge tank.

c) Right at the outlet on the surge tank that goes to the counterbalance cylinder.

d) Right at the inlet on the surge tank from the Fill/Dump valves.

e) If there is no surge tank the pressure transducer should be mounted right at the inlet on the counterbalance cylinder.

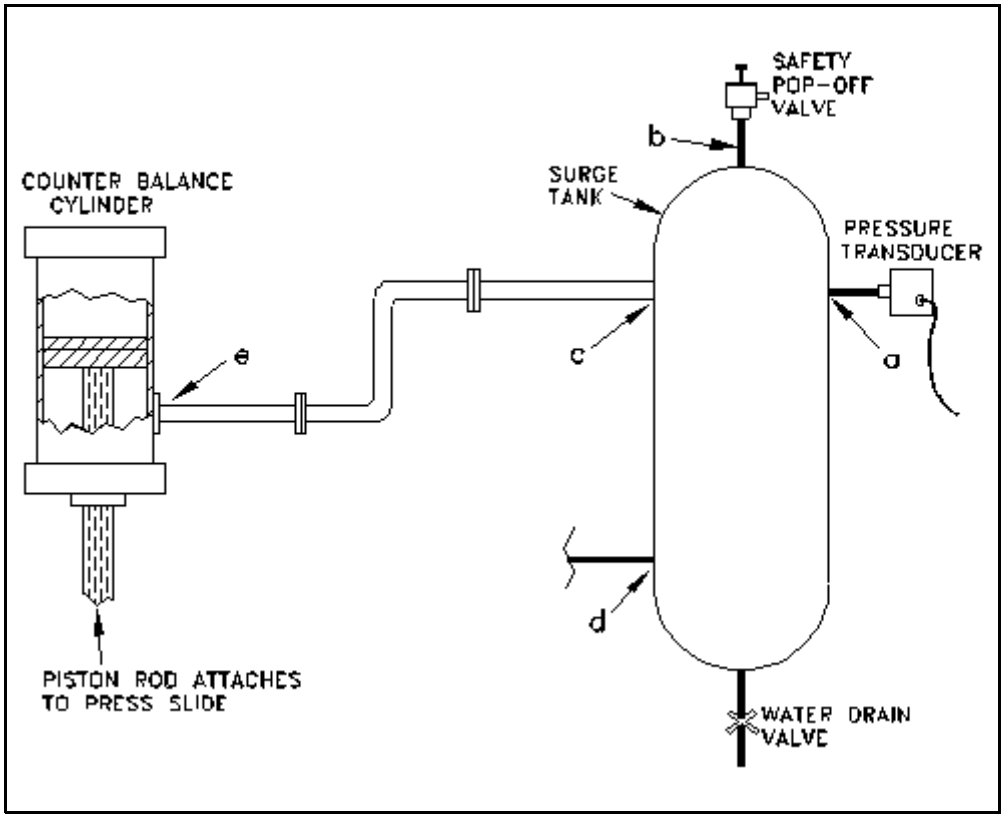


Figure 3.8: Acceptable Locations for Mounting Counterbalance Pressure Transducer.

Section 3.3.2 Counterbalance Air Valve System Mounting

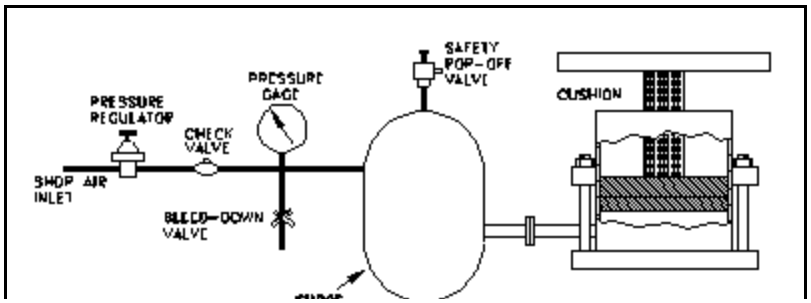
The mounting location of the valve system is not critical. Consideration should be given, however, to ease of maintenance, plumbing, and wiring when choosing the mounting location. Also note that sometimes the check valve in the original system may be up at the surge tank itself. The check valve in the original system *must* be removed for the automatic system to work properly.

Section 3.3.3 Counterbalance System Wiring

Refer to Appendix B, Figure B.1, for typical wiring of the counterbalance valve and pressure transducer. Note that the auto-select connection is used only for a type "C" valve. For type "A" valves, the auto-select connection from pin 2 of the counterbalance module is not required. If you order an OmniLink control with a counterbalance adjust system, then a wiring diagram will be provided as part of the documentation package.

Section 3.4 Cushion System Installation

The typical manually adjustable press cushion system looks something like Figure 3.9.



For automatic control, the pressure regulator and check valve are replaced with an air valve system. Figure 3.10 shows a system using a Type "B" valve as described in section 3.2. Type "A" and "C" valves may also be used. A pressure transducer is used to monitor the air pressure.

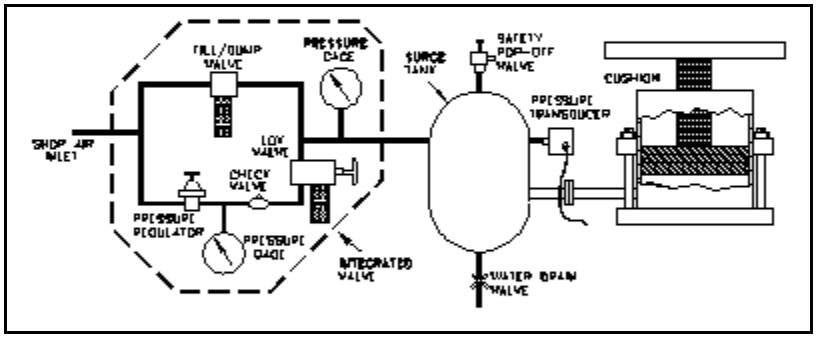


Figure 3.10: Cushion System with Type "B" Integrated Valve.

Section 3.4.1 Cushion Pressure Transducer Mounting

The system uses a method of control in which the fill valve or dump valve is energized to raise or lower the pressure of the system. The pressure transducer tells the system when it has reached the proper pressure. Because air pressure drops occur across air lines when filling or dumping, proper placement of the pressure transducer is very important for correct operation of the system. Possible pressure transducer mounting locations from best to worst are (refer to Figure 3.11):

a) A spare port on the cushion surge tank.

b) The same port that the safety pop-off valve is mounted on if it has its own port on the surge tank.

c) Right at the outlet on the surge tank that goes to the cushion.

d) Right at the inlet on the surge tank from the Fill/Dump valves.

e) If there is no surge tank the pressure transducer should be mounted right at the inlet on the cushion.

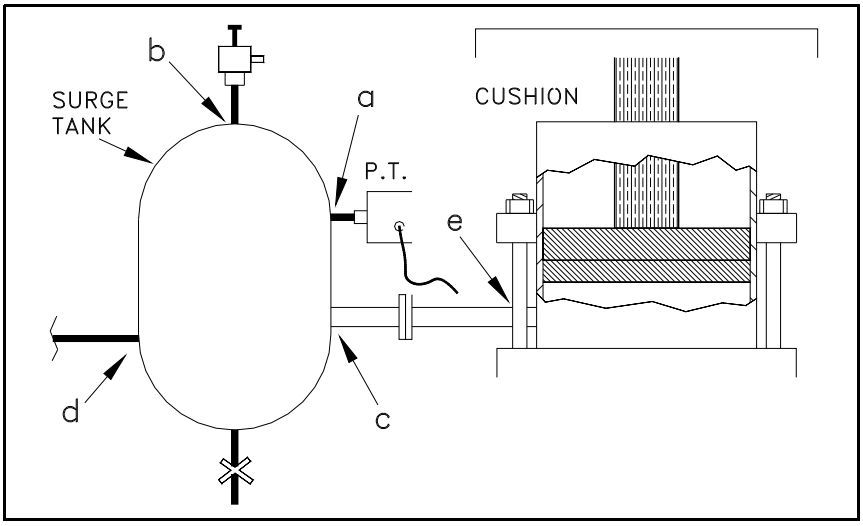


Figure 3.11: Acceptable Locations for Mounting Cushion Pressure Transducer.

Section 3.4.2 Cushion Air Valve System Mounting

The mounting location of the cushion air valve system is not critical. Consideration should be given, however, to ease of maintenance, plumbing, and wiring when choosing the mounting location. Also note that sometimes the check valve in the original system may be up at the surge tank itself. The check valve *must* be removed for the automatic system to work.

Section 3.4.3 Cushion System Wiring

Refer to Appendix B, Figure B.2, for typical wiring of the cushion valve and pressure transducer. Note that the auto-select connection is only connected if a type "C" integrated valve is used. For type "A" and "B" valves, the auto-select connection from pin 2 of the cushion module is not required. If your

control came configured for a cushion adjust system, then a wiring diagram should have been provided as part of the documentation package.

Section 3.5 Hydraulic Overload System Installation

Some press hydraulic overload systems use an air pressure to set up a much greater hydraulic pressure through an air pump to control the trip point (tonnage) at which the hydraulic overload cylinder will dump. On these presses the auto-setup card can use an E/P valve (also known as a servo valve) to actually set the trip point for the hydraulic overload.

These systems vary widely, and it will be necessary for Link to obtain prints of the press hydraulic overload system in order to determine where to mount control components. If your control came configured for a hydraulic overload adjust system, then a wiring diagram should have been provided as part of the documentation package.

Section 3.6 Slide Adjust System Installation

Standard slide adjust systems that set shut height on presses vary widely depending on manufacturer and age. In general, slide adjust systems are either manually turned by wrenches or levers, or use electric or air motors to adjust the shut height. The OmniLink automatic slide adjust system can only be used on presses with motorized slide adjust. Slide adjust motor(s) must be wired to the automatic shut height adjust module(s) in the OmniLink extended card rack. In addition, either a linear magnetostrictive or a rotary resolver based transducer must be mounted in such a way as to detect slide adjust position and wired to the automatic shut height module. Rotary transducers may be used when shafts that turn when shut height is adjusted are accessible such as a shaft that drives a mechanical shut height indicator. Linear transducers must be used if no rotating shaft is accessible, but the linear transducer can only be used on presses with barrel screw type adjustment mechanisms.

Section 3.6.1 Rotary Transducer Mounting

The Link software supports two different types of rotary transducers for the slide adjust system. Both are based on dual resolvers to provide an absolute position indication. Resolvers are a tough, accurate rotary position sensor. By using two resolvers mounted in an enclosure with one resolver geared down relative to the other, a multi-turn resolver (typically around 100 turns) is created.

As mentioned earlier, just about every slide adjust system is different. Some point must be found that rotates when the slide is adjusted. Some obvious points are the slide adjust motor shaft and the shaft that drives a dial counter (if present) that indicates slide position. Depending on the press, there may be other points that can be used. The resolver should be tied in to one of these points - and may need to be geared up or down. Requirements are:

a) As much as possible, the resolver should be mounted where it will not be submerged in oil, grease, or other contaminants.

b) The total slide travel from maximum shut height to minimum shut height **must not exceed** the number of turns of the resolver. If , for example, a 100 turn resolver is used, the total slide travel from maximum to minimum **must not result** in more than 100 turns at the resolver.

c) The slide should travel **no more** than 1 inch per turn of the resolver.

d) The cable from the resolver to the OmniLink 5000 should not be run with any high voltage wiring (i.e. 120/240 VAC). In fact, this cable should be run in its own shielded conduit.

It is not necessary to know the exact gear ratio of slide travel to resolver turns - only that conditions "b" and "c" are met. The resolver may rotate in either direction relative to slide travel (i.e. the resolver may rotate clockwise or counter-clockwise as the slide goes down).

Section 3.6.2 Rotary Slide Adjust Wiring

A cable must go from the dual resolver mounted on the slide to the auto-setup board in the OmniLink 5000 extended card rack. Since the slide goes up and down relative to the machine, some means of stress relief must be used on the cable between the slide and the machine frame. The recommended method is to use a helical cable (same principle as a telephone handset cord) from the resolver to a junction box on the bottom of the crown. This lets the wire run in a "spring" pattern to help it resist breaking. Appendix B, Figure B.3 shows a conceptual view of this type of resolver mounting. The junction box should be grounded to the machine to help shield the connections inside.

NOTE:	The cable should remain unbroken except for the connector in this junction box to keep the shield integrity - do not splice the cable!

Slide adjust motor starters with and without auxiliary contactors are supported. Solenoid air valves for air motors are also supported. Refer to Appendix B for typical wiring diagrams. Figures B.4 and B.5 show the wiring for two supported dual resolvers. Figures B.9 and B.10 show the wiring of slide adjust motor starters with and without auxiliary contactors. Figure B.11 shows the wiring of a slide adjust air motor. If an OmniLink 5000 control is ordered with a slide adjust system, then a wiring diagram will be provided as part of the documentation package.

Section 3.6.3 Linear Transducer Mounting

Linear shut height control makes use of linear magnetostrictive transducers. These transducers have a head that contains the electronics and a guide tube from 6" to 48" in length depending on the application. The guide tube is mounted to pass through (without touching) a separately mounted annular (doughnut shaped) magnet. The electronics sense the magnet location as the magnet moves up or down the guide tube when the slide is adjusted to provide shut height distance to the OmniLink 5000 control.

To install the linear transducer, there must be some point on the slide assembly that moves up and down with respect to a fixed point on the slide assembly when the shut height is changed. The transducer should be mounted to one point and the magnet to the other with strong, **rigid,** brackets. The particulars of mounting a linear transducer may vary greatly from press to press but keep in mind the following points:

a) Make sure there is adequate clearance from the transducer to the crown or other possible interference points of the press. A common mistake is mounting the transducer with the slide lowered and crushing the transducer when the slide is raised.

b) It may be necessary to order a transducer longer than the slide adjustment range because of mounting limitations.

c) Ferromagnetic material (a material readily magnetized - such as iron or steel) should be no closer than .25" from the magnet or the rod end. This includes ferrous screws! Non-ferrous metals such as aluminum, brass, and non-magnetic stainless can be in direct contact with the magnet or rod end.

d) Transducers longer than 30" may need special supports and split magnets.

e) The rod of the transducer is typically four to five inches longer than the specified length due to "dead zone" and "null zone" areas at the beginning and end of the rod.

f) The cable from the transducer to the OmniLink 5000 should not be run with any high voltage wiring (i.e. 120/240 VAC). In fact, the cable should be run in its own shielded conduit.

g) **Read the manufacturers instructions** that came with the transducer for other possible issues and mounting considerations.

Section 3.6.4 Linear Transducer Slide Adjust Wiring

A cable must go from the linear transducer mounted on the slide to the auto-setup board in the 5000 extended card rack. Since the slide goes up and down relative to the machine, some means of stress relief must be used on the cable between the slide and the machine frame. The recommended method is to use a helical cable (same principle as a telephone handset cord) from the transducer to a junction box on the bottom of the crown. This lets the wire run in a "spring" pattern to help it resist breaking. Appendix B, Figure B.6 shows a conceptual view of this type of mounting. The junction box should be grounded to the machine to help shield the connections inside.

NOTE:	The cable should remain unbroken except for the connector in this junction box to keep the shield integrity - do not splice the cable!

Slide adjust motor starters with and without auxiliary contactors are supported by the OmniLink shut height system as are solenoid operated valves for air motor operation. Refer to appendix "B" for typical wiring diagrams. Figures B.7 and B.8 show the wiring for two supported linear transducers. Figures B.9 and B.10 show the wiring of slide adjust motor starters with and without auxiliary contactors. Figure B.11 shows the wiring of a slide adjust air motor.

If you order an OmniLink 5000 control with a slide adjust system, a wiring diagram will be provided as part of the documentation package.

Section 4. Configuration

After the ASM is installed (see section 3.1), it must be configured to work with the press. Configuration consists of several steps that depend on the options selected for the ASM.

> **NOTE!** An access code is required to reach the configuration menus of the OmniLink 5000 press control. The code is provided separately from this manual for administrative control.

> **WARNING! Only qualified employees who are authorized by the user should configure the automatic set-up module. Failure to properly configure and calibrate the module can result in machine damage which, in turn, may result in injury or death to persons.**

Section 4.1 Setting up the OmniLink 5000 for the Auto-Setup Module

The OmniLink 5000 press control must be "told" that the 5000-10 ASM is installed in the card rack. If the module was installed at Link as part of an OmniLink 5000 package, this step will already be done and configuration should proceed with section 4.2.

a) Go to the Press Control (P/C) screen.

b) With the RUN/PROG key switch in the PROG position, press the "CONFIGURE" softkey and enter the configuration access code.

c) Press the "MACHINE PARAMETERS" softkey.

d) Press the "FACTORY CONFIG" softkey. The screen should now be similar to Figure 4.1.

e) Use the up and down arrow keys on the operator terminal to put the cursor on the "Automatic Setup" row and enter "001". If this parameter is "000" the OmniLink 5000 won't recognize and respond to the ASM

f) Press the "EXIT" softkey until the "Press Control" screen reappears.

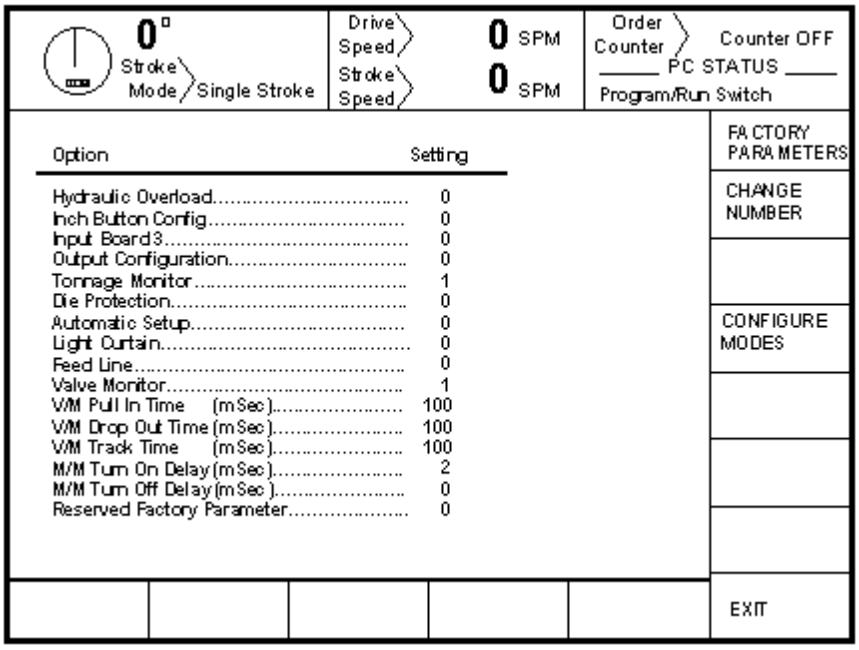


Figure 4.1: Factory Configuration Parameters

Section 4.2 Configuring the Auto-Setup board

The ASM must be configured for the each shut height and pressure module that is installed on it. The configuration necessary depends on the particular kind of module.

Section 4.2.1 Configuring Counterbalance, Cushion, and Hydraulic Overload Modules

Counterbalances and cushions are conceptually very similar and use essentially the same control techniques. Hydraulic overloads are somewhat different but are usually air controlled systems (there are some non-air controlled hydraulic overloads but the auto-setup board does not support them at this time). To get to the configuration screen for cushion, counterbalance, and hydraulic overload modules:

a) Go to the "Auto Sets" screen. This screen is reached by pressing the "AUTO SETS" softkey in the Main Menu or Press Control screen.

b) With the RUN/PROG key switch in the PROG position, press the "CONFIGURE" softkey and enter the configuration code. Note that the code is provided separately from this manual for administrative control.

c) Press the "CONFIGURE AIR" softkey.

At this point the screen should look similar to Figure 4.2.

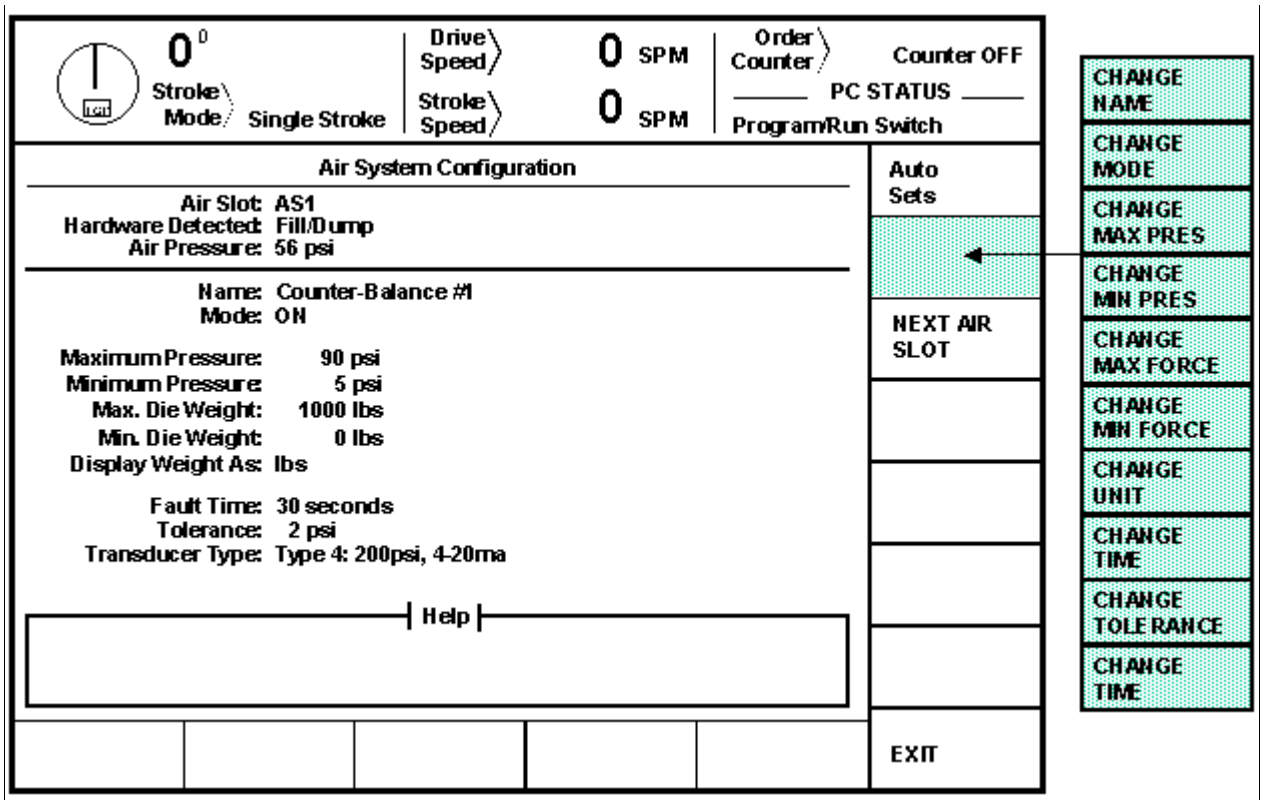


Figure 4.2: Example Air Configuration Screen

There are several parameters that must be configured in this screen. The editing cursor indicates which parameter is currently selected. Softkey 1 (the uppermost vertical softkey) will change its description based on the parameter and, when pressed, allows the currently selected parameter to be changed. The up and down arrow keys move the editing cursor from one parameter to another. *See Appendix A for examples of setting up each kind of system.* The features of this screen are:

Help — The "Help" box at the bottom of the screen changes depending on the parameter that the editing cursor is currently on. It gives a short version of how the parameter is used.

Air Slot — Corresponds to the physical slot number (AS1 in the example of Figure 4.2) selected for configuration on the auto-setup card. AS5 and AS6 do not exist but are reserved for future expansion. The "NEXT AIR SLOT" softkey will cycle through the available slots in the system. Note that "AS7" is built in to the base auto-setup board and is always installed.

Hardware Detected — For counterbalances and cushions this should be "Fill/Dump" (referring to the control method for the board). For hydraulic overloads this should be "0-10Volt Out". If there is no board installed in that slot the board will be "None Detected".

Air Pressure — Gives a readout of the current pressure detected by the pressure transducer based on the transducer type selected. Note that when the transducer type is changed, this pressure will also change even though the actual air pressure stays the same. This value can not be changed by the user. It is reported in this screen for convenience.

Name — Press the "CHANGE NAME" soft key repetitively to cycle through and select the available names for the module in the slot which you are configuring (Counter-Balance #1, Counter-Balance #2, Cushion #1, Cushion #2, Cushion #3, Cushion #4, Hydraulic Overload, Not Configured). Stop when the desired name appears.

Mode — Use the "CHANGE MODE" soft key to cycle the status from *ON* to *MAN* to *OFF* and back to *ON*. *ON* means the OmniLink 5000 will automatically adjust the air pressure when a job is recalled to the air pressure associated with that job. *MAN* means the OmniLink 5000 will automatically adjust the air pressure, but the pressure can only be changed from the Auto Setup screen by entering the desired air pressure. A recalled job will NOT change the pressure if you configure the module to *MAN*. *OFF* means the OmniLink 5000 will not control the air pressure. This value should typically be set to *ON*.

Max. Pressure — This value should be set to the maximum operating air pressure at which the counterbalance, cushion, or hydraulic overload is designed to operate.

For counterbalances, this is the pressure which counterbalances the heaviest upper die the press is designed to accommodate. The press counterbalance table (typically mounted on the press) or the press manual should give this value.

For cushions this should be the maximum operating pressure specified by the cushion manufacturer.

For hydraulic overloads this value should be the pressure specified by the press manufacturer for rated tonnage operation.

Min. Pressure This value should be set to the minimum operating pressure at which you will operate your counterbalance, cushion, or hydraulic overload.

For counterbalances, this value is the pressure that balances the slide with no tooling and cannot be set below 5 psi. Obtain this value from the press counterbalance table or press manual.

For cushion(s), the Min. Pressure should be set to at least the value that just barely supports the weight of the cushion cylinder. This can be found by slowly increasing the pressure to the cushion until it just starts to rise. Then back off the pressure until it just starts to fall. The Min. Pressure should be set to at least the average of the two pressures. The Type "B" and "C" valve systems may be used to provide a minimum pressure through their manual regulator. This keeps the cushion from falling due to air leakage when the control is powered off and prevents cushion pins from falling through the lower die shoe and bolster.

NOTE! Cushions can always drift down when the plant air supply is off. Also, If a type "B" valve is used, Min Pressure must be set above the manual regulator setting.

For hydraulic overloads, the Min. Pressure should generally not be set to less than 25% of the Max. Pressure value.

Max. Die Weight **This parameter only appears when a counter balance is being configured.** This should be set at the die weight the counterbalance handles at its maximum pressure. Obtain this value from the press counterbalance table or press manual. Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Min. Die Weight.

Min. Die Weight **This parameter only appears when a counter balance is being configured.** Set this value to 0 die weight. (This represents no tooling on the upper slide at the minimum counterbalance pressure). Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Max. Die Weight.

Display Weight As **This parameter only appears when a counter balance is being configured.** Set this parameter to the units that die weight should be displayed in. The choices

are pounds (lbs), kilograms (Kgs), tons, and metric tons (Mtons). Note that the display unit can be changed at any time and is independent of the units that the maximum and minimum die weight are using. If a job was stored in tons, and this unit is changed to pounds, the stored job will still be correct. For example, if 2 tons were stored for a job and the display unit is changed to pounds, when the job is recalled it will be set to 4000 pounds.

Max. Cushion Force **This parameter only appears when a cushion is being configured.** This should be set to the cushion force generated at its maximum pressure. Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Min. Cushion Force.

Min. Cushion Force **This parameter only appears when a cushion is being configured.** Set this value to the force generated at the Min. Pressure you have selected. Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Max. Cushion Force.

Display Force As **This parameter only appears when a cushion is being configured.** Set this parameter to the units that cushion force should be displayed in. When the "CHANGE UNIT" softkey is pressed, the choices listed will be pounds (lbs), kilograms (Kgs), tons, and metric tons (Mtons). Note that the display unit can be changed at any time and is independent of the units used for minimum and maximum cushion force. If a job was stored in tons, and this unit is changed to pounds, the stored job will still be correct. For example, if 2 tons were stored for a job and the display unit is changed to pounds, when the job is recalled it will be set to 4000 pounds.

Max. Trip Point **This parameter only appears when a hydraulic overload is being configured.** This should be set to the trip tonnage at the maximum pressure. Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Min. Trip Point.

Min. Trip Point **This parameter only appears when a hydraulic overload is being configured.** Set this value to the force generated at the Min. Pressure you have selected. Note that the units to the right of this parameter are also configurable. When the editing cursor is placed on these units, softkey 1 will read "CHANGE UNIT". When pressed, pounds, kilograms, tons, or metric tons may be selected from a list. Note that changing the unit here will also change the unit for Max. Trip Point.

Display Trip As **This parameter only appears when a hydraulic overload is being configured.** Set this parameter to the units that the trip point should be displayed in. The

choices are pounds (lbs), kilograms (Kgs), tons, and metric tons (Mtons). Note that the display unit can be changed at any time and is independent of the units used for minimum and maximum trip point. If a job was stored in tons, and this unit is changed to pounds, the stored job will still be correct. For example, if 2 tons were stored for a job and the display unit is changed to pounds, when the job is recalled it will be set to 4000 pounds.

Fault Time — If the pressure in a counterbalance, cushion, or hydraulic overload system goes out of tolerance due to a leak or any other reason, a countdown starts. The control will try to bring the pressure back into tolerance before the countdown expires. If it can not correct the pressure, the press will be stopped. The fault time is the countdown in seconds. Suggested value is 20 seconds.

Tolerance — This is the amount by which the system will allow the pressure to vary and still be considered "good". For instance if tolerance is 2, then a setting of 30 psi will be considered "At Pressure" from 28 to 32 psi. Suggested setting is 2.

Transducer Type — This value depends on the kind of pressure transducer used on the system. Table 4.1 gives the transducer type number to use with various transducers. Contact Link for others. Note that the used pressure range is typically half the actual pressure range of the transducer. This allows the transducers to better survive pressure shocks that may occur in operation.

Table 4.1: Transducer Types

Manufacturer / Model	Transducer Pressure Range	Used Pressure Range	Output	Trans Type
Any / Any	0-250psi	0-125psi	4-20ma	3
Any / Any	0-200psi	0-100psi	4-20ma	4
Any / Any	0-300psi	0-150psi	4-20ma	5
Any / Any	0-400psi	0-200psi	4-20ma	6

Valve Type — **This parameter only appears when a hydraulic overload is being configured.** For hydraulic overloads controlled with "0-10Volt Out" proportional voltage, refer to table 4.2 for the proper control type based on the servo-valve used to control the system.

Table 4.2: Servo-Valve Control Types

Manufacturer / Model	Pressure Range	Input	Control Type
Wilkerson ER1 Series	0-125psi	0-10V	4

Table 4.2: Servo-Valve Control Types			
Wilkerson ER1 Series	0-90psi	0-10V	5
SMC ITV2050-31T2S4	0-130psi	0-10V	6

Section 4.2.2 Configuring Slide Adjust Modules

To get to the configuration screen for slide adjust modules:

a) Go to the "Auto Sets" screen. This screen is reached by pressing the "AUTO SETS" softkey in the Main Menu or Press Control screen.

b) With the RUN/PROG key switch in the PROG position, press the "CONFIGURE" softkey and enter the configuration code. The code is provided separately from this manual for administrative control.

c) Press the "CONFIGURE SLIDE"softkey.

d) Turn the Slide Adjust OFF/ON selector switch for your control to the ON position.

At this point the screen should look similar to Figure 3.3.

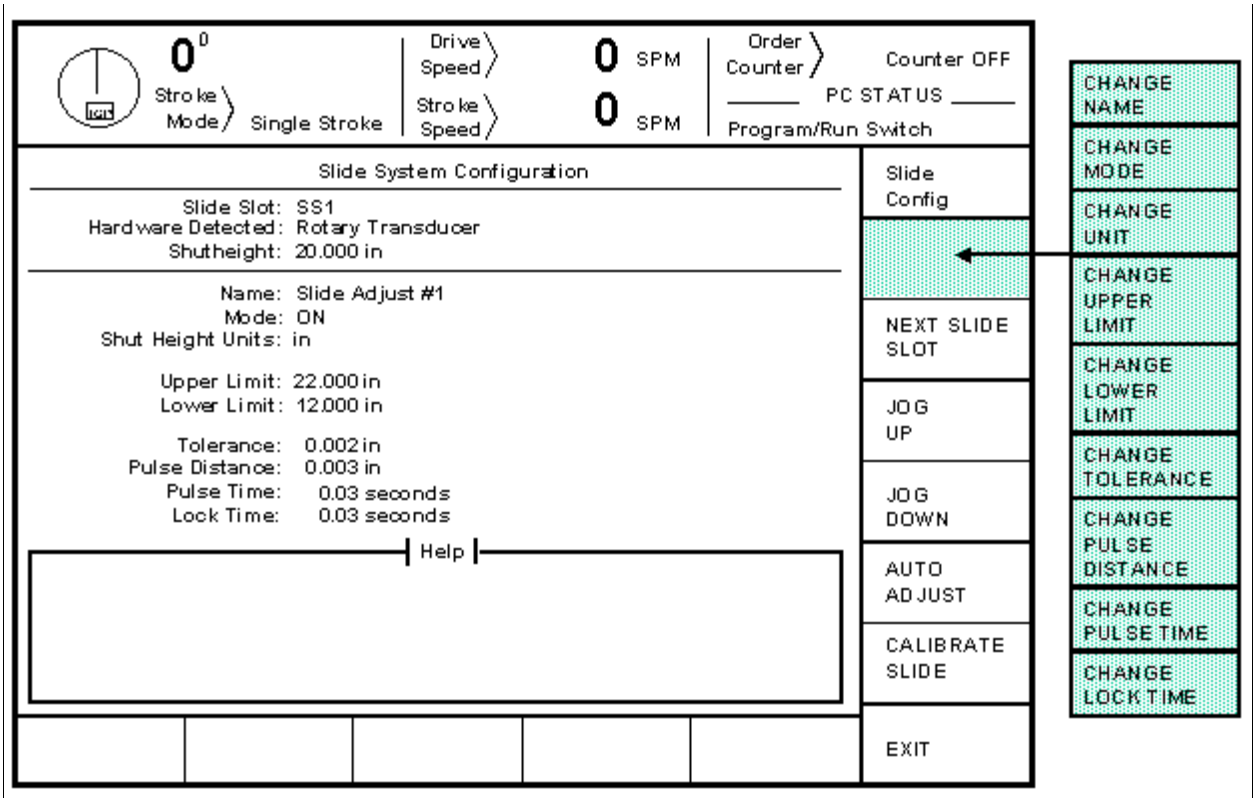


Figure 4.3: Example Slide Configuration Screen

There are several parameters that must be configured in this screen. The editing cursor indicates which

parameter is currently selected. Softkey 1 (the uppermost vertical softkey) will change its description based on the parameter and, when pressed, allows the currently selected parameter to be changed. The up and down arrow keys move the editing cursor from one parameter to another. *See Appendix A for examples of setting up each kind of system.* The features of this screen are:

Help — The "Help" box at the bottom of the screen changes depending on the parameter that the editing cursor is currently on. It gives a short version of how the parameter is used.

Slide Slot — Corresponds to the physical slot number (SS1 in the example of Figure 4.3) selected for configuration on the auto-setup card. The "NEXT SLIDE SLOT" softkey will cycle between SS1 and SS2.

Hardware Detected — This will be "Linear Transducer" for 5000-10B option boards or "Rotary Transducer for 5000-10C option boards. If there is no option board installed in that slot this should read "None Detected".

Shutheight — The current slide position reported by the transducer. **NOTE!** This number will be incorrect until Cal. Position and Orientation are entered during configuration. This is reported as a convenience in this screen cannot be changed by the user.

Name — Use the "CHANGE NAME" soft key repetitively to cycle through the available names for this system (Slide Adjust #1, Slide Adjust #2, Not Configured). Stop when the desired name appears. This name will appear on the Auto-Sets screen.

Mode — Use the "CHANGE MODE" soft key to cycle the status from *ON* to *MAN* to *OFF* and back to *ON*. *ON* means the OmniLink 5000 automatically adjusts to the new shut height associated with a job when that job is recalled from memory, but **only** if the Slide Adjust OFF/ON selector switch is turned to the ON position. *MAN* means the OmniLink 5000 can control the shut height but the shut height can only be changed from the "Slide Adjust" screen. A **RECALLED** job will **NOT** change the shut height, although an operator can cause the system to automatically adjust to a new shut height by turning the Slide Adjust OFF/ON switch to the ON position, entering the desired shut height value in the "Slide Setpoint" row, and pressing the "AUTO ADJUST" softkey. *OFF* means the 5000 will not automatically adjust the shut height, and will ignore any errors from the system. Operators can always manually jog the slide into position through the use of the "JOG UP" and "JOG DOWN" softkeys. These keys appear when the Slide Adjust OFF/ON switch is in the ON position regardless of whether *ON, MAN,* or *OFF* is configured. This value should typically be set to ON.

Shut Height Units — All shutheight parameters and the shut height actual position can be displayed and entered in inches or millimeters. Use the "CHANGE UNIT" softkey to toggle this setting between inches and millimeters. Note that values already entered will be converted to the new unit.

Upper Limit This value is an electronic upper limit for the slide adjust system that acts as a backup for the mechanical up limit switch. The automatic shut height system will not adjust the shut height above this value, which should be set just below where the mechanical up limit switch open up.

Lower Limit This value is an electronic lower limit for the slide adjust system that acts as a backup for the mechanical down limit switch. The automatic shut height system will not adjust the shut height below this value, which should be set just above where the mechanical down limit switch opens up.

Tolerance This value determines how far off the slide can be from the slide setpoint and still be considered "In Position". Recommended initial value is .004" (.10mm). While the automatic slide adjust system will normally make its initial adjustment to within .001" (.02mm) of the selected setpoint value, the impact created by the stamping operation may cause the shut height to change slightly as clearances in gears and threads of the slide adjustment mechanism shift. If the design or condition of the press causes the shut height to change by more than the tolerance (measured at the top of the stroke) after stamping begins, the tolerance must be set to a higher value. It may also be possible to set this value lower on some presses.

Pulse Distance The automatic slide adjust is always accomplished by going above the desired shut height setpoint value and descending to the setpoint value. The pulse distance value must be set to cause the slide adjust system to make a preliminary stop slightly **above** the desired setpoint. The system will then incrementally "pulse" the slide adjust motor to achieve the desired slide setpoint position. The pulse distance value must be set by trial and error. A good starting point is .010" (.25mm). This value would turn off the slide adjust motor .010" (.25mm) above any setpoint entered before the pulse sequence would begin. The final stopping point will be **less** than .010" (.25mm) above the setpoint value, and **may** end up **below** the desired setpoint since electrical reaction times and mechanical inertia will cause the slide to travel slightly further after the signal to stop is given. The pulse distance selected is too large if the system has to pulse more than a few times to get into final position after the preliminary stop, and should be decreased. The pulse distance selected is too small if the system overshoots the desired slide setpoint position, and should be increased. No pulses will occur if this happens because the shut height will already be below the intended setpoint.

Pulse Time The system pulses the slide adjust motor starter when it gets close to where it wants to go in order to do fine positioning, i.e., after making the preliminary stop determined by the pulse distance. The pulse time must be set by trial and error. A good starting value for this parameter is .03 sec. If the system cannot pulse into position during an auto adjust sequence, then this value should be increased. A pulse time that produces an average change of about a half a thousandth of an inch in shutheight for each pulse is desirable. Too long a pulse time will result in overshooting the setpoint limit by an unacceptable amount. Reduce the pulse time if significant overshoot occurs.

Lock Time Most slide adjust systems now use an integrated brake built in to the slide adjust motor that automatically locks the system down when the slide adjust motor is not on. "Lock Time" is used only for slide adjust systems that have a **separate** locking system that must be disengaged before the slide adjust motor is engaged. The lock time is the amount of time the system will wait before energizing the slide adjust motor after unlocking the system to prevent the slide adjust motor from trying to run before the lock fully releases.

Section 4.2.2.1 Calibrating Linear Slide Adjust Systems

After setting the parameters in the previous section, the linear slide system must be calibrated before it can be used.

WARNING!	**Since the slide adjust configuration procedure requires measurement of the space between the press slide and bed or bolster, this procedure must be performed with no dies or tooling in the press to prevent the possibility of a point of operation or pinch point injury to personnel making the measurement. Failure to heed this warning may result in serious injury or death.**

IMPORTANT!	Configuring/calibrating the slide adjust module should **only** be done with no dies installed in the press **and**, for presses equipped with slide counterbalance systems, should proceed **only** after the counterbalance is properly adjusted to offset the weight of the slide. If counterbalance pressure is too low, bearing clearances will cause shut height measurements made during calibration to be too small.

To calibrate a linear slide adjust system:

a) Make sure the upper and lower limit settings have been set correctly in the slide configuration screen of Figure 4.3.

b) Press the "CALIBRATE SLIDE" softkey in the slide configuration screen of Figure 4.3.

c) A screen will appear with a warning that calibrating the slide should not be undertaken without first reading this manual. Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

d) The "orientation" of the linear transducer must now be set. This should be set to 0 if the magnet moves toward the control head (where the transducer cable plugs in) of the transducer when the slide is going **up**. Use 1 if the magnet travels toward the control head when the slide is going **down**. Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

e) The "wire speed" (if a GEMCO linear transducer is used) or the "gradient" (if an MTS linear

transducer is used) must now be set. This value is listed on the transducer model plate. Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

f) Finally, the "Calibration Point" must be set. The slide should be taken to bottom dead center (180 degrees) and the shut height should be measured. **Without moving the slide** that measurement should be entered here. This tells the system what the current shut height is. Press the "CONTINUE SLIDE CAL." softkey.

g) The slide system should now be calibrated. **Check for proper operation** by running the slide up near the top of the adjustment range and checking the slide position reported. Note that linear transducers are repeatable but not absolutely accurate. This means the reported slide position may differ from the measured position by as much as .030". Repeat this process with the slide near the bottom of the adjustment range.

WARNING:	**After calibration always check for proper operation of the slide adjust system as wiring or transducer faults could cause an invalid calibration. Bad measurements could result in damage to the machine and tooling, and can cause injury or death.**

Section 4.2.2.2 Calibrating Rotary Slide Adjust Systems

After setting the parameters in the previous section, the rotary slide system must be calibrated before it can be used.

IMPORTANT!	Configuring/calibrating the slide adjust module should **only** be done with no dies installed in the press **and**, for presses equipped with slide counterbalance systems, should proceed **only** after the counterbalance is properly adjusted to offset the weight of the slide. If counterbalance pressure is too low, bearing clearances will cause shut height measurements made during calibration to be too small.

WARNING!	**Since the slide adjust configuration procedure requires measurement of the space between the press slide and bed or bolster, this procedure must be performed with no dies or tooling in the press to prevent the possibility of a point of operation or pinch point injury to personnel making the measurement. Failure to heed this warning may result in serious injury or death.**

To calibrate a rotary slide adjust system:

a) Make sure the upper and lower limit settings have been set correctly in the slide configuration

screen of Figure 4.3.

NOTE:	It is absolutely critical to set the upper and lower limits correctly before calibrating a rotary slide adjust system. The calibration process uses this information to map the turns from the dual resolver into the measurement space of the slide. **If the upper and lower limits are not set correctly, the system may fail to calibrate!**

b) Press the "CALIBRATE SLIDE" softkey in the slide configuration screen of Figure 4.3.

c) A screen will appear with a warning that calibrating the slide should not be undertaken without first reading this manual. Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

d) Now the screen should warn that the upper and lower limits must be set correctly before continuing slide calibration. See step "a" above. Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

e) The number of resolver turns must now be set. Use table 4.3 to find the correct number of turns for the resolver used in the system.

Table 4.3: Resolver Turns

Manufacturer	Model #	Turns
AMCI	HTT-20-100	100
AMCI	HTT-20-180	180
Patriot (GEMCO)	SD-0410900	64
Patriot (GEMCO)	SD-0410901	128

Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

f) The system now needs an upper calibration point. With the press as near as possible to bottom dead center (180 degrees), use the "JOG UP" and "JOG DOWN" softkeys to take the slide near the top of the adjustment range. The slide should be slightly lower than the upper limit that was entered on the slide configuration screen. Take the measurement of the shut height in this position as carefully and accurately as possible and **without moving the slide** enter the number as requested on the screen.

NOTE:	It is **very important** to make as accurate a measurement as possible for the Upper and Lower Calibration Points. If these measurements are wrong, then the slide position reported by the system will also be wrong!

Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

g) Finally, the lower calibration point must be set. Use the "JOG UP" and "JOG DOWN" softkeys to take the slide near the bottom of the adjustment range. The slide should be slightly higher than the lower limit entered on the slide configuration screen. Take the measurement of the shut height in this position as carefully and accurately as possible and **without moving the slide** enter the number as requested on the screen.

NOTE:	It is **very important** to make as accurate a measurement as possible for the Upper and Lower Calibration Points. If these measurements are wrong, then the slide position reported by the system will also be wrong!

Press the "CONTINUE SLIDE CAL." softkey to continue the calibration process or "EXIT" to return to slide configuration.

h) The slide system should now be calibrated. **Check for proper operation** by running the slide up near the top of the adjustment range and checking the slide position reported. Repeat this process with the slide near the bottom of the adjustment range.

WARNING:	**After calibration always check for proper operation of the slide adjust system as wiring or transducer faults could cause an invalid calibration. Bad measurements could result in damage to the machine and tooling, and can cause injury or death.**

Section 5 Operation

The purpose of the Auto-Setup module is to allow automatic adjustment of such press systems as air counterbalances, air cushions, air operated hydraulic overloads, and slide adjust systems to greatly reduce setup time for different jobs, and to help ensure that these systems are adjusted correctly for different jobs.

All operation of auto-setup functions, other than automatic adjustments to previously stored values when the OmniLink 5000 recalls a job, start from the Auto-Sets screen. This screen is displayed when the "AUTO SETS" softkey on the Main Menu or Press Control screen is pressed. The Auto-Sets screen shows all configured functions and allows their settings to be adjusted. Figure 5.1 shows an example Auto-Sets screen. Note that each configured function (slide adjust, counterbalance, cushion, or hydraulic overload) has its own box with name, settings, position or pressure, status, and fault.

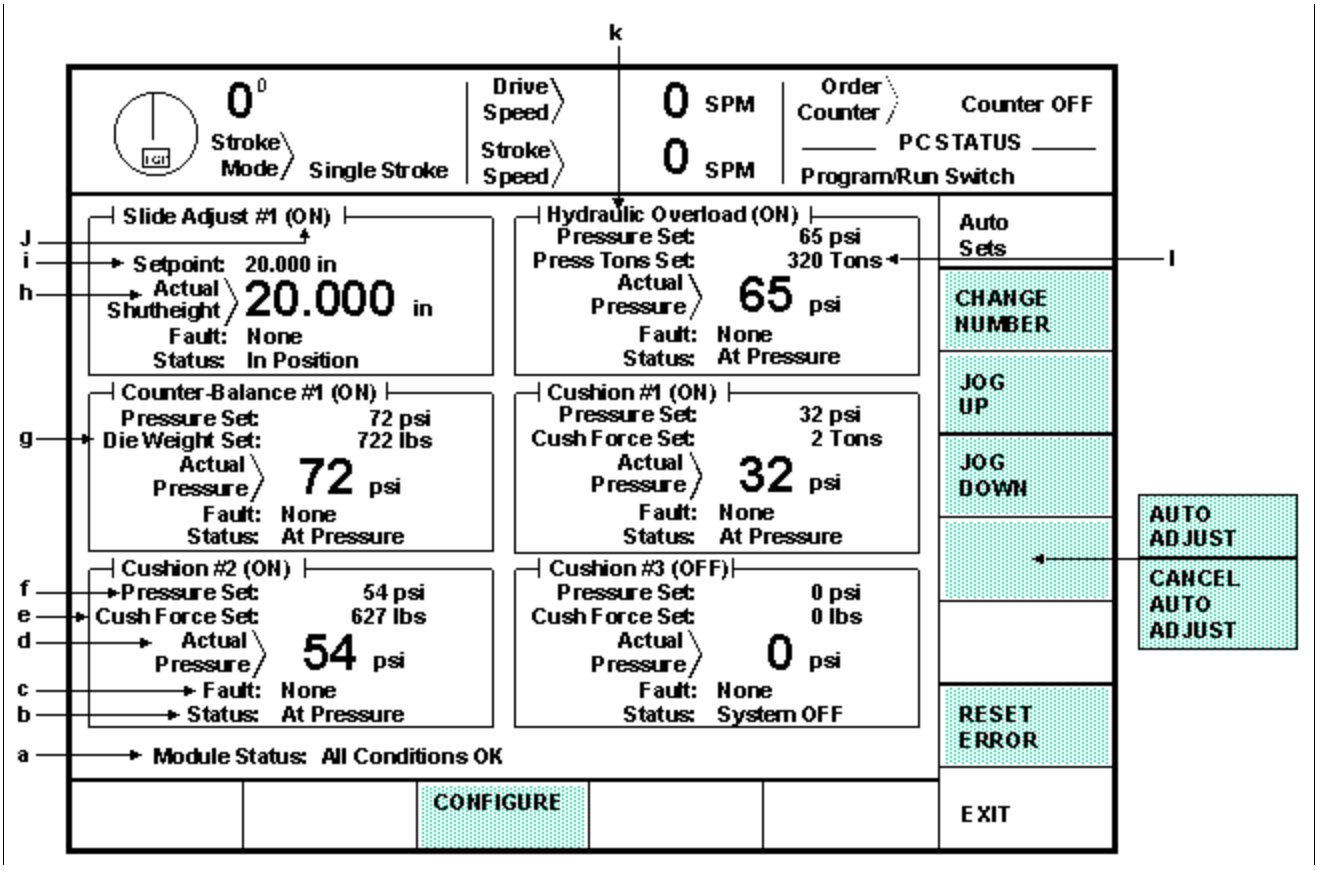


Figure 5.1: Example Auto-Sets Screen

The main features of this screen are:

a) The module status gives the overall status of the auto setup module as a whole instead of the status of a single sub-system, such as a counterbalance. When the module is functioning properly, thus should read "All Conditions OK". See section 6.1 for other diagnostic messages.

b) Each configured sub-system has a status. Under normal conditions, this status will read "At Pressure" for air-based sub-systems such as counterbalances that are within the tolerance setting of the set pressure. Slide sub-systems will read "In Position" when within the tolerance setting

for the shut height setpoint. See section 6 for an explanation of all status messages for the various sub-systems.

c) Each configured sub-system has a fault message. Under normal conditions, this fault should read "None". See section 6 for an explanation of all fault messages for the various sub-systems.

d) Air pressure controlled sub-systems (counterbalances, cushions, and hydraulic overload) display the current actual pressure for that system in large numbers for easy visibility.

e) Cushions allow the setpoint pressure to be entered directly in psi or to be set in force. This force can be pounds, kilograms, tons, or metric tons depending on how the system is configured. The configuration parameters (see section 4.2.1) allow the system to convert from force to psi automatically.

f) Air pressure controlled sub-systems (counterbalances, cushions, and hydraulic overload) have a pressure setpoint in psi. This number is the intended pressure for that system.

g) Counterbalances allow the setpoint pressure to be entered directly in psi or to be set in terms of die weight. This weight can be pounds, kilograms, tons, or metric tons depending on how the system is configured. The configuration parameters (see section 4.2.1) allow the system to convert from weight to psi automatically.

h) Slide adjust system show the shut height reported by the transducer in large numbers for easy visibility. This number will be in inches or millimeters depending on how the system is configured. See section 4.2.2 for details.

i) The slide setpoint is the desired shut height for a slide in inches or millimeters depending on how the system is configured (see section 4.2.2 for details).

j) Each configured sub-system has an indicator that tells what mode the system is in - ON, OFF, or MANUAL. See section 4 for details on the mode.

k) Each configured sub-system is named at the top of the box in which its parameters and settings are shown.

l) Hydraulic overloads allow the setpoint pressure to be entered directly in psi or to be set in terms of press trip point. This point can be pounds, kilograms, tons, or metric tons depending on how the system is configured. The configuration parameters (see section 4.2.1) allow the system to convert from trip point to psi automatically.

There are a number of softkeys in this screen:

"CHANGE NUMBER" This key allows the parameter that the editing cursor is currently on to be changed. The editing cursor may be placed on a parameter using the up, down, left, and right arrow keys. This key is not always available depending on the access code configuration as defined in section 2.

"CONFIGURE" Allows the individual options such as counterbalance, cushion, and slide adjust modules to be configured during initial installation of the system and will not be used for production operation setup. Note that this key is only available when the RUN/PROG keyed switch is in the PROG position.

"JOG UP" Press this softkey to move the slide up. A momentary push will "pulse" the slide up once for fine control. If the key is held down for more than about ½ a second, the slide will move up continuously until the key is released. This key is only available when the keyed slide adjust switch is in the ON position and the editing cursor is on the slide setpoint.

"JOG DOWN" Press this softkey to move the slide down. A momentary push will "pulse" the slide down once for fine control. If the key is held down for more than about ½ a second, the slide will move down continuously until the key is released. This key is only available when the keyed slide adjust switch is in the ON position and the editing cursor is on the slide setpoint.

"AUTO ADJUST" Press this softkey to automatically move the slide to the setpoint. An auto adjust sequence always goes above the setpoint and then comes down to it for consistency. This key is only available when the keyed slide adjust switch is in the ON position and the editing cursor is on the slide setpoint. Note that when an auto adjust sequence is in progress, this key will change to "CANCEL AUTO ADJUST". When pressed under this circumstance, it will cancel the auto adjust sequence and cause slide motion to stop.

"RESET ERROR" Certain errors will cause the auto setup module to generate a top stop or cycle stop to the press. When this occurs, the "RESET ERROR" softkey will appear. Before the press can be started again, the fault must be corrected and this key must be pressed to clear the error condition. Note that this is a restricted operation and an access code may be required depending on system configuration as detailed in section 2.

Section 5.1 Slide Adjust Operation

Each configured slide system has its own "box" on the screen (Figure 5.1 shows a setup with only one slide adjust system). The title of the box has the shut height system name and the mode the system is in (ON, OFF, or MANUAL). This box contains:

Setpoint The *desired* position of the slide shut height adjustment. This number may be changed by manual operator entry when the operator has access via key or user code depending on the configuration of the system as detailed in section 2. The setpoint will also be changed to the required slide setpoint for a previously stored job when that job setup is recalled from memory and the system is ON. The units for this setpoint can be in inches or millimeters depending on the configuration. See section 4.2.2 for details.

Actual Position The *actual* position of the slide shut height adjustment as indicated by a linear or

rotary transducer mounted on the slide system of the press. The units for the position can be in inches or millimeters depending on the configuration. See section 4.2.2 for details.

Fault — If the slide adjust system detects an error it will be reported on this line. A fault occurs when a hardware or firmware problem is diagnosed by the system. See section 6 for fault messages and their meanings.

Status — The current status of the slide adjust system. Status messages indicate what the system is doing in the normal course of its operation. See section 6 for status messages and their meanings.

Section 5.1.1 Slide On, Manual, and Off Settings

The Auto-Setup module allows three modes of operation to be chosen in the configuration menu for each slide adjust system - "ON", "MAN" (manual), or "OFF". ON is the proper mode for the normal intended use of the system.

The operator or setup person cannot change the mode in the operation screen but the setting is reported at the top of the slide adjust box after the slide name ("Slide Adjust #1" or "Slide Adjust #2") for convenience.

The mode setting affects the operation of the slide system in the following ways:

"ON" — Jobs that are recalled will automatically move the slide to the position stored in the job subject to the conditions described in section 5.1.2. The "AUTO ADJUST" softkey can be used to initiate automatic movement of the slide to the currently programmed setpoint. The "JOG UP" and "JOG DN" softkeys can be used to manually move the slide.

"MAN" (manual) — This mode can be chosen if there is some reason the employer does not want to allow recall of previously stored job setups from memory. The slide position will not automatically change when a job is recalled. The slide setpoint can still be changed by manual entry of the desired setpoint and by pressing the "AUTO ADJUST" softkey to initiate an auto adjust sequence. The "JOG UP" and "JOG DN" softkeys can be used to manually move the slide.

"OFF" — The slide position will not automatically change when a job is recalled. No automatic movement will occur even if the "AUTO ADJUST" softkey is pressed. The "JOG UP" and "JOG DN" softkeys will still move the slide. This mode is provided to allow temporary reversion to completely manual adjustment of shut height by use of the "JOG UP" and "JOG DN" softkeys if the slide mounted transducer fails.

Section 5.1.2 Automatic Slide Movement

Automatic movement of the slide can be initiated by either pressing the "AUTO ADJUST" softkey in

the slide adjust screen or when a stored job is recalled and the system is "ON". Note that the "AUTO ADJUST" key will only appear when the slide adjust switch is ON and the editing cursor is on the slide adjust setpoint of a slide adjust system. An auto adjust sequence always approaches the slide setpoint from above. For instance, if the current position is 10.000 and the slide setpoint is 12.000, the auto adjust sequence might take the slide first to 12.015, then back to 12.004, and then "pulse" the slide the last four thousandths into position. This is to ensure consistent setups by taking up gear lash from the same direction every time. **Note that a slide setpoint of 00.000 (used to store a job that will not overwrite the previous slide setpoint on recall), will prohibit automatic adjustment**. Automatic movement is subject to the following conditions:

a) The slide adjust switch must be on.

b) The press must be stopped.

c) The press must be at the top of the stroke.

d) The hydraulic overload on the press, if present, must not be tripped.

e) The Link Master Control (LMC) relay must be engaged.

f) There must be no faults in the slide system and the counterbalance system, if present.

g) The auto adjust sequence for the slide will not start until the counterbalance system, if present, is at least up to its pressure setpoint. If the **correct** pressure setpoint for the counterbalance has been entered, this will ensure that the counterbalance has taken up any clearances in the slide connection system to increase accuracy of shut height adjustment. When the slide adjust system waits for the counterbalance system to finish adjusting to its pressure setpoint, the status message of the slide adjust system will be "Waiting for Cntr-Bal".

NOTE!	A counterbalance pressure that is far too low or far too high during any shut height adjustment may place excessive load on the shut height adjust motor and may even stall the motor. This condition can also occur with non-automatic motorized slide adjust systems. If the automatic slide adjust doesn't see slide adjust movement within two seconds of a command to move, it will stop its command to move and generate the Fault message "Slide Did Not Move".

IMPORTANT!	Automatic movement will be terminated if the ESTOP button, "JOG UP" softkey, "JOG DN" softkey, or "CANCEL AUTO ADJUST" softkey is pressed while the slide is moving automatically. Automatic movement will pause if the slide adjust switch is turned off. It will resume when the slide adjust switch is turned back on.

Section 5.1.3 Manual Slide Movement

As noted in the section explaining the softkeys in the slide screen, the slide may be manually moved by pressing the "JOG UP" and "JOG DN" softkeys. Note that the jog keys will only appear when the editing cursor is on a slide adjust setpoint. These keys will work regardless of whether the slide system is on, off, or in manual mode. Note, however, that these keys will not override the mechanical up and down limit switches in the slide. In addition, these keys will not allow movement beyond the electronic limits entered in the configuration screen for the slide unless the slide system is "OFF".

Section 5.1.4 Slide Fault and Status

The last fault and current status of the slide system are displayed for diagnostic and informational purposes. Under normal conditions "Fault" should be "None". If there is a problem with the slide system, it will be reported here. "Status" gives the current state of the system such as "In Position", Slide Low", "Moving Up" etc. For the most part these messages will be self explanatory. See section 6 for a complete list of fault and status messages with explanations.

Section 5.2 Air System (Counterbalance, Cushion, and Hydraulic Overload) Operation

Counterbalances, cushions, and hydraulic overloads (at least the overloads the ASM supports) are all controlled by air pressure and as such are grouped as "air systems". Each configured air system has its own "box" on the screen (see Figure 5.1). The title of the box has the air system name and the mode the system is in (ON, OFF, or MANUAL). This box contains:

Pressure Set — The *desired* pressure of the air system in psi. This number may be changed by manual operator entry when the operator has access via key or user code depending on the configuration of the system as detailed in section 2. It may also be automatically changed to the required pressure setpoint for a previously stored job when that job setup is recalled from memory and the air system is "ON".

Die Weight Set — For counterbalances only, the *desired* die weight to be counterbalanced by the air system. This number may be changed by manual operator entry when the operator has access via key or user code depending on the configuration of the system as detailed in section 2. It will also be changed to the required die weight setpoint for a previously stored job when that job setup is recalled from memory and the air system is "ON". This number can be set in pounds, kilograms, tons, or metric tons depending on the configuration as detailed in section 4.2.1.

Cush Force Set — For cushions only, the *desired* cushion force to be generated by the air system. This number may be changed by manual operator entry when the operator has access via key or user code depending on the configuration of the system as detailed in section 2. It will also be changed to the required cushion force

setpoint for a previously stored job when that job setup is recalled from memory and the air system is "ON". This number can be set in pounds, kilograms, tons, or metric tons depending on the configuration as detailed in section 4.2.1.

Press Trip Set — For hydraulic overloads only, the *desired* trip point to be set by the air system. This number may be changed by manual operator entry when the operator has access via key or user code depending on the configuration of the system as detailed in section 2. It will also be changed to the required trip point for a previously stored job when that job setup is recalled from memory and the air system is "ON". This number can be set in pounds, kilograms, tons, or metric tons depending on the configuration as detailed in section 4.2.1.

Actual Pressure — The *actual* air pressure of the air system in psi as measured by a pressure transducer that is an input to the system.

Fault — If the air system detects an error it will be reported on this line. A fault occurs when a hardware or firmware problem is diagnosed by the system. See section 6 for a list of fault messages and their meanings.

Status — The current status of the air system. Status messages indicate what the system is doing in the normal course of its operation. See section 6 for a list of status messages and their meanings.

Section 5.2.1 Air System On, Manual, and Off Settings

An air system can be set in the configuration menu to modes of "ON", "MAN" (manual), or "OFF". The operator can not change this mode setting in the operation screen but the setting is reported on the top line after the air system name for operator information. The ON setting is the normal setting for each air system.

The mode setting affects the air system in the following ways:

"ON" — Jobs that are recalled from memory will automatically take the air system to the pressure stored in the job.

"MAN" (manual) — The air pressure will not automatically change when a job is recalled. The pressure or force setpoint can still be changed by manually entering a desired pressure setpoint.

"OFF" — The air pressure will not automatically change when a job is recalled. The OmniLink 5000 will not control the air pressure in any way. For units equipped with an integrated valve with manual fallback, the manual side will be engaged and pressure can be adjusted through a manual regulator.

Section 5.2.2 Pressure and Force Setpoints

Pressure can be set in one of two ways. First, if the air system was correctly configured, the desired force which the pressure is to create can be entered in the "Force Setpoint" row on the air pressure screen. Second, if preferred, the desired air pressure in psi may be entered into the "pressure setpoint" row.

For counterbalances, the "Die Weight Set" is the weight of the upper die that attaches to the slide. (The counterbalance must also offset the weight of the press slide, but since this is a constant accounted for when the system is configured, only the upper die weight need be entered). The upper die weight, which is required by OSHA to be stamped on the die, can be entered in the force setpoint row.

For cushions, the "Cush Force Set" is the amount of "push" that is exerted by the air pressure times the cylinder area.

For hydraulic overloads, the "Press Trip Set" is the value, usually in tons, at which you wish the hydraulic overload system to trip.

Note that pressure, die weight, cushion force, and trip points are restricted items as defined in section 2. The RUN/PROG key, a user code, or both may be required to change them. If a force setpoint is entered, the proper pressure in psi will be calculated and applied to the system. Likewise if pressure is entered, the force setpoint will be calculated and displayed.

Section 5.2.3 Air System Fault and Status

The last fault and current status of the air system are displayed for diagnostic and informational purposes. Under normal conditions the "Fault" message should be "None". If there is a problem with an air system, it will be reported on the "Fault" line. "Status" gives the current state of the system such as "At Pressure", "Filling", "Dumping" etc. For the most part these messages will be self explanatory. See section 6 for a complete list of fault and status messages with explanations.

Section 5.3 Job Storage and Recall Issues

There are a few things to keep in mind for job storage and recall:

a) A store operation must be done for the current air pressure and slide adjust setpoints to be stored in the job number. If you recall a job and then change one or more of the recalled setpoints, the changed setpoints will **not** be stored for later recall **unless** you store the job again while the setpoints are set at the new value.

b) Since one or more cushions may or may not be used with any given die, the On/Off status of each cushion system is stored with the job. For example, Job #1 is stored with "Cushion #1" turned off. Next, Job #2 is stored with "Cushion #1" turned on. Every time Job #1 is recalled, "Cushion #1" will be turned off. Every time Job #2 is recalled, "Cushion #1" will be turned on. **Note that if the cushion system is in manual mode then the above does not apply!**

c) If a job is recalled when the press is not at the top, the slide adjust system will display a status of

"Waiting for Top". When the press does reach the top and all other necessary conditions are satisfied, the slide will go to the slide setpoint.

d) If a job is recalled when the slide adjust switch is not on, the slide adjust system will display a status of "Waiting S/A Switch". When the slide adjust switch is turned on and all other necessary conditions are satisfied, the slide will go to the slide setpoint.

e) When a job is recalled, the slide will not complete the auto adjust sequence until the counterbalance system, if present, has at least reached operating pressure. While the slide is waiting it will display a status of "Waiting for Cntr-Bal". This allows the counterbalance to take up any clearances in the system for a consistent setup.

f) If a slide adjust system is stored in a job with a slide setpoint of 0, then when that job is recalled the current setpoint will not be replaced and the slide will not move. This is to accommodate intermediate jobs in a setup that may need to cycle cushion pressures before the slide moves.

Section 6 Diagnostics - Fault and Status Messages

When the press control screen reports a stop condition that indicates the auto-setup board asserted or is asserting a stop signal, the "Auto-Sets" screen module status and the individual sub-systems status line will give additional information.

Section 6.1 Main Module Messages

All Conditions OK — General Module status is ok. This does not mean that the individual sub systems such as shut height control, counterbalance, and cushion control are ok.

Communication Fault — The OmniLink 5000 OIT cannot communicate with the auto-setup card. This may indicate a total failure of the base card or a blown communications chip.

A/D Converter Fail — The A/D converter on the base card of the auto-setup module is not responding correctly. This will prevent operation of all air controlled systems such as counterbalances, cushions, and hydraulic overload. If the air system is using a type "C" valve (see section 3.1), it can be turned OFF in the configurations screen and will revert to manual control.

Bad Config Data — The configuration data stored in non-volatile ram was corrupted. The auto-setup card will need to be reconfigured after pressing the reset error key in the "Auto Sets" screen.

Bad NV Ram — The non-volatile ram cannot be read or written to correctly. This indicates a hardware problem with either the microprocessor or the ram.

Interrupt Timeout — The OmniLink 5000 control should send an interrupt to the auto-setup module every so often. This error is generated if that does not happen and indicates some kind of hardware problem.

Section 6.2 Counterbalance, Cushion, and Hydraulic Overload "Fault" Messages

None — No error.

Transducer Fail — The pressure transducer gave a reading that is out of its normal range or gave no reading at all. Check that the transducer cable is still plugged in. If it is, check for cable damage. If the cable checks out the transducer may need to be replaced.

Bad Module — The unit did not sense an option module in the slot it was configured for. Indicates that the option card is unplugged or has failed.

Fill/Dump Reversed — Indicates the fill output was connected to the dump valve and vice versa. The system checks the air pressure when it is filling or dumping and if it goes the other direction assumes the lines have been connected incorrectly.

Unable to Fill — The system was unable to make progress when trying to raise the air pressure. This could be a bad connection to the fill valve, a failed fill valve, or no plant air pressure. Probably the most common cause would be a bad air leak in the system.

Unable to Dump — The system was unable to make progress when trying to lower the air pressure. Probably a bad connection to the dump valve or a failed dump valve.

Max. Press. Exceeded — The air pressure exceeded the maximum pressure programmed in the configuration menu. Probably indicates a leaking fill valve or bad wiring causing the fill valve to be on too long.

Not at Min. Pressure — The air pressure is not at the minimum pressure programmed in the configuration menu.

A/D converter Fail — The A/D converter failed so no pressure readings can be made. Indicates a hardware error on the base board.

Bad Config Data — The configuration data for this system was corrupted. The information in the configuration menu for this system must be reentered.

Pressure Switch Low — There is a pressure switch on the input air supply to the air valves. If the input air pressure is too low then the system could open the fill valve intending to raise the pressure but instead vent some air back into the air supply. The system will not fill as long as the pressure switch is low.

Section 6.3 Counterbalance, Cushion and Hydraulic Overload "Status" Messages

At Pressure — The air system is within tolerance of its target pressure.

Filling — The system is filling (raising the air pressure).

Dumping — The system is dumping (lowering the air pressure).

Air Pressure High — The air pressure in the system is too high.

Air Pressure Low — The air pressure in the system is too low.

System is Off — The system has been turned off in the configuration menu. The pressure will still be displayed if the transducer is working properly. In addition, if the system is equipped with a type "C" integrated valve (see section 3.1), the air pressure may still be adjusted with the manual regulator.

System Vented — A pressure setpoint of 0 psi was entered for a cushion system. The dump valve is left open in this condition.

Ctr-Bal Vented -Stop A pressure setpoint of 0 was entered for a counterbalance. The dump valve is left open in this condition. Unlike a cushion, this is considered a stop condition.

Hyd Overload Tripped The hydraulic overload operation screen will display this message when the press hydraulic overload system is tripped.

Waiting for Top The hydraulic overload system is waiting for the press to reach the top of the stroke before it adjusts the hydraulic overload setting.

LMC is Out The Link Master Control relay is disengaged for some reason (possibly an error at the control). No air adjustment may be made while the LMC is tripped.

Section 6.4 Slide Adjust "Fault" Messages

None No errors present.

Up and Down Reversed The "Up" relay has been connected to the "Down" side of the motor starter and vice versa. The system checks position when moving the slide and generates this message if it goes in the opposite direction from that intended.

Slide Did Not Move If the slide does not move within approximately 2 sec this error will be generated. Possible causes are counterbalance pressure so far off that the slide adjust motor cannot overcome it, wiring problems, starter overloads, a picofuse blown on the slide adjust module, or other mechanical failures.

Slide Adj. Sw. Fail Slide adjust switch failure. If the main 5000 control reports to the auto-setup card that the slide adjust switch is ON but no AC voltage is detected at the slide adjust relays this error will be generated. It is also generated if the 5000 reports slide adjust switch OFF but the auto-setup module does see AC voltage at the relays.

Up Relay Open The "Up" solid state relay on the slide adjust module failed open. Indicates a hardware failure of the relay.

Up Relay Shorted The "Up" solid state relay on the slide adjust module failed shorted. Indicates a hardware failure of the relay.

Down Relay Open The "Down" solid state relay on the slide adjust module failed open. Indicates a hardware failure of the relay.

Down Relay Shorted The "Down" solid state relay on the slide adjust module failed shorted. Indicates a hardware failure of the relay.

Lock Relay Open The "Lock" solid state relay on the slide adjust module failed open. Indicates

a hardware failure of the relay.

Lock Relay Shorted — The "Lock" solid state relay on the slide adjust module failed shorted. Indicates a hardware failure of the relay.

Transducer Fail — For linear slide systems, indicates that the linear transducer is not sending information to the slide adjust module. This may be a cable problem, unplugged connector, failed power supply, failed transducer, or option board (5000-10B) problem.

For rotary slide systems, indicates that the fine resolver is not being read correctly. This could be a cable problem, unplugged connector, failed transducer, or option board (5000-10C) problem.

Coarse Resolver Fail — The coarse resolver on a rotary system could not be read correctly. This could be a cable problem, unplugged connector, failed resolver, or option board (5000-10C) problem.

Res. Moved in Check — The fine resolver moved while the coarse resolver was being read. Indicates the resolver may be mounted too loosely or that the slide adjust motor brake is not holding.

Resolver Misaligned — The fine and coarse resolvers are no longer in proper alignment. Indicates that one of the resolvers is loose (internally). The resolver may need to be checked or replaced. The system will need to be recalibrated.

Res. Gearing Wrong — The resolver is geared too high or too low. Refer to section 3.6.1 for resolver gearing requirements.

Bad Module — The unit did not sense a slide adjust module in the slot it was configured for. Indicates that the card has become unplugged or that the card has failed.

Bad Config Data — The configuration data for this system was corrupted. The system must be reconfigured.

Section 6.5 Slide Adjust "Status" Messages

In Position — The slide is within tolerance of the slide setpoint.

Up Limit Switch Open — The slide has hit the mechanical up limit switch and can go no higher.

Down Limit Sw. Open — The slide has hit the mechanical down limit switch and can go no lower.

Max Position Reached — The slide has gone as high as the max position programmed in the configurations menu and will not be allowed to go higher.

Min Position Reached	The slide has gone as low as the min position programmed in the configuration menu and will not be allowed to go lower.
Moving Up	The slide is moving up.
Moving Down	The slide is moving down.
System Off	The slide adjust system is turned off. The slide can still be manually moved by using the jog up and jog down buttons. The slide position will still be shown if the position transducer is still functioning correctly.
Waiting for Cntr-Bal	The slide adjust system is waiting for the counterbalance, if present, to come to its correct pressure before automatically moving the slide.
Slide Too High	The slide is higher than the slide setpoint plus tolerance.
Slide Too Low	The slide is lower than the slide setpoint minus tolerance.
Hyd Overload Tripped	The hydraulic overload has tripped. The slide will not move down in this condition.
Auto-Adjusting	The slide is automatically going to the programmed slide setpoint.
Waiting for Top	The slide must be at the top of the stroke for automatic positioning to occur. If a job is recalled at the bottom of the stroke, this message will be displayed until the press is at the top.
E-Stop Button	Emergency stop button is depressed. The slide will not automatically move in this condition.
Waiting S/A Switch	Waiting for the slide adjust switch to be turned on. The slide cannot move while the slide adjust switch is in the off position.
LMC is Out	The Link Master Control relay is disengaged for some reason (possibly an error at the control). No slide movement may be made while the LMC is tripped.

Appendix A Configuration Examples

This section of the manual will go though an example setup of each kind of system on a "typical" press. Each example assumes that the hardware installation has been completed and the system is ready for configuration.

The following examples assume the access system is using "Key Only" mode as described in section 2. Other modes may require entering a user code to change certain parameters.

Section A.1 Example Counterbalance Configuration

This example assumes the counterbalance system has been wired to the option board at "AS1". First, some information needs to be gathered.

From the press counterbalance table mounted on the frame of the machine (or found in the press manual), we find that at zero die weight, the counterbalance pressure should be 25 psi. The maximum upper die weight for our example press is 7500 pounds. At that weight, the table says the pressure should be 78 psi.

The pressure transducer installed on the system is a Setra model C206 that has a pressure range of 0 to 250 psi and an output of 4 to 20 ma.

A type "C" integrated valve controls the pressure (see section 3.1 for a discussion of valve types).

Now we go to the "Auto Sets" screen and with the RUN/PROG switch in PROG hit the "CONFIGURE" softkey. After typing the configuration code, we press the "CONFIGURE AIR" softkey.

Since the counterbalance is wired in at "AS1", if the slot reported on the screen in not already "AS1", we hit the "NEXT AIR SLOT" softkey until it is. The hardware detected should be "Fill/Dump".

The first thing we must configure is the "Name" of the system. The cursor should already be on the "Name" line so we check to see if the name is already "Counter-Balance #1". If not, place the editing cursor on the name and press the "CHANGE NAME" softkey to cycle through the systems.

Using the arrow keys, we move the editing cursor to the "Transducer Type" line. Looking at table 4.1, we see that the transducer type for any model pressure transducer with a 250 psi pressure range and a 4 to 20 ma output is "Type 3" . We hit the "CHANGE TYPE" softkey and select Type 3 from the list that appears. When the proper type is selected, the "Air Pressure" line should change to read the pressure currently in the counterbalance system.

Next we use the arrow keys to move the editing cursor to the "Maximum Pressure" line. Since we found earlier that the pressure used to balance the heaviest die the press supports is 78 psi, we hit the "CHANGE MAX PRES" softkey and key in this value.

Going to the "Minimum Pressure" line, we enter in 25 psi, the value that balances only the slide.

Next, "Max. Die Weight" is entered as 7500, the weight counterbalanced at the maximum air pressure.

Note that units to the right of the number are also an editable parameter. When the editing cursor is placed on the Max Die Weight units, we can press the "CHANGE UNIT" softkey to get a list of supported units. The units can be pounds, kilograms, tons, or metric tons. We are using pounds. Note that the units for minimum and maximum die weight will always be the same, but will not necessarily be the same as the "Display Weight As" units. This allows us to enter the die weights in whatever units the name plate uses, but operate the press in a different set of units.

"Min. Die Weight" for a counterbalance should typically be 0. This represents no tooling on the upper die.

The "Display Weight As" units we set to pounds.

The "Fault Time" we leave at 20 seconds.

The "Tolerance" is left at the default 2 psi.

Finally, we go back to the "Mode" line and use the "CHANGE MODE" key to toggle the mode to "ON". The "Auto Sets" operation screen can now be used to set the air pressure or die weight. See section 5.2 for operation details.

Section A.2 Example Cushion Configuration

This example assumes the cushion system has been wired to the option board at "AS2". First, some information needs to be gathered.

From the press manual or cushion information plate we find that the effective area of the cushion is 100 square inches and the maximum operating pressure is 90 psi. This means that the cushion will exert 100 pounds of force for every 1 psi of cushion pressure (100 square inches * 1 pound per square inch). We also found out from experimentation that is takes about 3 psi to initially move the cushion, and that the cushion just starts to fall at 2 psi. This tells us that approximately 2 psi is required to overcome the weight of the cushion piston and pressure plate.

The pressure transducer installed on the system is a Setra model C206 that has a pressure range of 0 to 250 psi and an output of 4 to 20 ma.

A type "B" integrated valve controls the pressure (see section 3.1 for a discussion of valve types).

Now we go to the "Auto Sets" screen and with the RUN/PROG switch in PROG hit the "CONFIGURE" softkey. After typing the configuration code, we press the "CONFIGURE AIR" softkey.

Since the cushion is wired in at "AS2", if the slot reported on the screen in not already "AS2", we hit the "NEXT AIR SLOT" softkey until it is. The hardware detected should be "Fill/Dump".

The first thing we must configure is the "Name" of the system. The cursor should already be on the "Name" line so we check to see if the name is already "Cushion #1". If not, the "CHANGE NAME" softkey allows us to cycle through the systems.

Using the arrow keys, we move the cursor to the "Transducer Type" line. Looking at table 4.1, we see that the transducer type for any model pressure transducer with a 250 psi pressure range and a 4 to 20 ma output is "Type 3". We hit the "CHANGE TYPE" softkey and select Type 3 from the list that appears. When the proper type is selected, the "Air Pressure" line should change to read the pressure currently in the cushion system.

Next we move the editing cursor to the "Maximum Pressure" line. Since we found earlier that the maximum pressure allowed on the cushion is 90 psi, we hit the "CHANGE MAX PRES" softkey and key in this value.

Going to the "Minimum Pressure" line, we enter in 2 psi, the value that just supports the weight of the cushion piston and pressure plate.

Next we have to calculate "Max. Cushion Force". We know that for every psi the cushion will generate 100 pounds of force. Since the maximum pressure is 90 psi and 2 psi is used to overcome the cushion weight, the max force will be (90 psi - 2 psi) * 100 square inches - or 8800 pounds. Note that units to the right of the number are also an editable parameter. When the editing cursor is placed on the Max Die Weight units, we can press the "CHANGE UNIT" softkey to get a list of supported units. The units can be pounds, kilograms, tons, or metric tons. We are using pounds. Note that the units for minimum and maximum cushion force will always be the same, but will not necessarily be the same as the "Display Force As" units. This allows us to enter the maximum and minimum cushion forces in whatever units the name plate uses, but operate the press in a different set of units.

"Min. Cushion Force" for the cushion should be 0. This is because the minimum pressure (2 psi) is only sufficient to balance the cushion itself.

The "Display Force As" units we set to pounds.

The "Fault Time" we leave at 20 seconds.

The "Tolerance" is left at the default 2 psi.

Finally, we go back to the "Mode" line and use the "CHANGE MODE" softkey to toggle the mode to "ON". The "Auto Sets" operation screen can now be used to set the air pressure or cushion force. See section 5.2 for operation details.

Section A.3 Example Hydraulic Overload Configuration

This example assumes the hydraulic overload system has been wired to the base auto setup board at "AS7". First, some information needs to be gathered.

From the press manual or the press manufacturer, find the minimum air pressure at which the hydraulic overload system will reliably operate and the tonnage trip point that corresponds to that pressure. Also find the maximum pressure at which the hydraulic overload is intended to operate and the tonnage trip point that corresponds to that pressure. Assume we find that the maximum pressure is 80 psi and corresponds to a 400 ton trip point. We also find that the press manufacturer recommends a pressure no lower than 20 psi which represents a 100 ton trip point.

The pressure transducer installed on the system is a Setra model C206 that has a pressure range of 0 to 250 psi and an output of 4 to 20 ma.

An SMC ITV2050-31T2S4 servo-valve will be used to control the pressure. This valve is 0-130 psi with a 0-10V input.

Now we go to the "Auto Sets" screen and with the RUN/PROG switch in PROG hit the "CONFIGURE" softkey. After typing the configuration code, we press the "CONFIGURE AIR" softkey.

Since the hydraulic overload is wired in at "AS7", if the slot reported on the screen in not already "AS7", we hit the "NEXT AIR SLOT" softkey until it is. The hardware detected should be "0 - 10 Volt Out".

The first thing we must configure is the "Name" of the system. The cursor should already be on the "Name" line so we check to see if the name is already "Hydraulic Overload". If not, the "CHANGE NAME" softkey allows us to cycle through the systems.

Using the arrow keys, we move the cursor to the "Transducer Type" line. Looking at table 4.1, we see that the transducer type for any model pressure transducer with a 250 psi pressure range and a 4 to 20 ma output is "Type 3". We hit the "CHANGE TYPE" softkey select Type 3 from the list that appears. When the proper type is selected, the "Air Pressure" line should change to read the pressure currently in the hydraulic overload system.

Next we use the arrow keys to move the editing cursor to the "Maximum Pressure" line. From the information we already gathered, we enter 80 psi.

Going to the "Minimum Pressure" line, we enter 20 psi.

"Max. Trip Point" should be the tonnage trip point at the Max Pressure (80 psi in this case) so we enter 400 tons. Note that units to the right of the number are also an editable parameter. When the editing cursor is placed on the Max Trip Point units, we can press the "CHANGE UNIT" softkey to get a list of supported units. The units can be pounds, kilograms, tons, or metric tons. A hydraulic overload will typically use tons and that is what we select. Note that the units for minimum and maximum trip point will always be the same, but will not necessarily be the same as the "Display Trip As" units. This allows us to enter the minimum and maximum trip points in whatever units the name plate uses, but operate the press in a different set of units.

"Min. Trip Point" should be the tonnage trip point at the Min Pressure (20 psi in this case) so we enter 100 tons.

The "Display Trip As" units we set to tons.

The "Fault Time" we leave at 20 seconds.

The "Valve Type" is set to "6". This value comes from table 4.2 for the type of servo valve we have.

The "Tolerance" is left at the default 2 psi.

Finally, we go back to the "Mode" line and use the "CHANGE MODE" softkey to toggle the mode to "ON". The "Auto Sets" operation screen can now be used to set the air pressure or trip tonnage. See section 5.2 for operation details.

Section A.4 Example Linear Slide Adjust Configuration

This example assumes the linear slide adjust system has been wired to the option board at "SS1". First, some information needs to be gathered.

A GEMCO 952 series linear transducer is mounted on the press slide. From the name plate on the transducer, we find that the wire speed is 9.219 microseconds per inch. Remember that some transducer manufacturers may call this "gradient" but the value must always represent microseconds per inch.

From the nameplate on the press or the press manual, we find that the minimum shut height is 12.500 inches and the maximum shut height is 16.000 inches.

Now we go to the "Auto Sets" screen and with the RUN/PROG switch in PROG hit the "CONFIGURE" softkey. After typing the configuration code, we press the "CONFIGURE SLIDE" softkey.

Since the slide adjust system is wired in at "SS1", if the slot reported on the screen in not already "AS1", we hit the "NEXT SLIDE SLOT" softkey until it is. The hardware detected should be "Linear Transducer".

The first thing we must configure is the "Name" of the system. The cursor should already be on the "Name" line so we check to see if the name is already "Slide Adjust #1". If not, the "CHANGE NAME" softkey allows us to cycle through the systems.

During initial slide setup, the "Mode" of the slide needs to be set to "OFF". Moving the editing cursor to the mode parameter, we hit the "CHANGE MODE" softkey until the mode reads "OFF".

Before we set anything further, we need to choose the units for the slide system. Moving the editing cursor to the "Shut Height Units" parameter, we use the "CHANGE UNIT" softkey to set the units to inches for this example. Note that this sets the units for all other shut height position or distance parameters on this screen and during calibration. After calibration, the units can be changed, if desired.

The "Upper Limit" and "Lower Limit" we set to 16.000 inches and 12.500 inches respectively. When the mode if the system is "OFF", these limits are not enforced. This allows us to check the operation of the mechanical limit switches.

The "Tolerance", "Pulse Distance", "Pulse Time", and "Lock Time" are left at .004, .010, .03, and 0 respectively - the default values. We may find these have to be changed later on.

We find that the magnet on the linear transducer travels toward the control head (where the cable comes out) as the press is going up. We need to know this for calibration.

Before calibrating the slide, we MUST make sure the slide is properly counterbalanced, if a counterbalance is used on our press. If the slide is not properly counterbalanced, the slide calibration

will be flawed because clearances will not be taken up by the counterbalance.

Now we press the "CALIBRATE SLIDE" softkey to perform the actual slide calibration as described in section 4.2.2.1 using the wire speed from the transducer nameplate (9.219 in this example) and an orientation of 0.

After calibration, the "Present Position" field in the slide configuration screen should display the number we just entered for the calibration position to the nearest thousandth. In other words, if we had entered 14.074 inches for our calibration position, the present position should read 14.073 to 14.075 inches.

Now we take the press back to the top of the stroke. With the slide adjust switch on, "JOG UP" and "JOG DOWN" softkeys should be displayed in the slide configuration screen.

Using the jog keys, we raise the slide to verify that the upper mechanical limit switch works correctly. Be **very careful** as the slide approaches the true maximum shut height (16.000 inches in this example) as the upper limit switch may be inoperative or misadjusted. Replace or adjust the limit switch as necessary.

In the same way, we verify that the lower mechanical limit switch works correctly. Again for emphasis, be **very careful** as the slide approaches the true minimum shut height (12.500 inches in this example) as the lower limit switch may be inoperative or misadjusted. Replace or adjust the limit switch as necessary.

If desired, the "Upper Limit" and "Lower Limit" can be set to be more restrictive than the actual minimum and maximum shut heights.

Next we go to the "Mode" line of the system and turn it "ON" by cycling through the choices with the "CHANGE MODE" softkey.

The last thing we must do is verify that the "Pulse Distance" and "Pulse Time" settings work for our press. These settings affect how automatic adjustment works. We hit "Exit" twice to return to the "Auto Sets" screen and hit the "RESET ERROR" softkey, if necessary, to clear errors in the slide adjust system. The slide setpoint should also be set to some reasonable value. In this example, the slide should still be at our calibration point of 14.074 inches. We set the slide setpoint to 14.000 inches.

After clearing errors, if present, we go back to the slide configuration screen. With the slide adjust switch on, we should see "JOG UP", JOG DOWN", and "AUTO ADJUST" softkeys. Again we check to make sure the slide is properly counterbalanced. If it is not then the following tests will be meaningless. An under or over counterbalanced slide will not move the same way that a properly counterbalanced slide will.

For fine adjustment purposes, a momentary push of the "JOG UP" or "JOG DOWN" key will "pulse" the slide motor starter for "Pulse Time" seconds. We hit a jog key to see how far the slide moves with one pulse. Ideally, it should take around 2 pulses to move .001 inch. We hit the "JOG DOWN" key and find that it takes 5 pulses to move the slide .001 inch - too many. We change the "Pulse Time" value to ".04" sec. Repeating the test, we find that it now takes 1 to 2 pulses to move .001 inch - an acceptable value.

Now it is time to hit the "AUTO ADJUST" softkey. The slide moves up past 14.000 (the slide setpoint we entered in the operation screen) and stops momentarily at 14.025. It then comes back down and stops at 13.996. The "Pulse Distance" value is set too high. What should have happened is that the slide would go over 14.000, come back down to a position just over 14.000 - say 14.003 - and then pulse into position at 14.000. Since we went under our setpoint by .004 inches, we change the "Pulse Distance" to .017 inches (adding .004 for the undershoot plus .003 for good measure to the original value of .010). Now when we hit the "AUTO ADJUST" softkey the slide travels first to 14.039, stops momentarily, travels down to 14.003, and pulses the slide into position at 14.000 - perfect.

See section 5.1 for further details on slide adjust operation.

Section A.5 Example Rotary Slide Adjust Configuration

This example assumes the rotary slide adjust system has been wired to the option board at "SS1". First, some information needs to be gathered.

A 100 turn AMCI series dual resolver is mounted on the press slide.

From the nameplate on the press or the press manual, we find that the minimum shut height is 12.500 inches and the maximum shut height is 16.000 inches.

Now we go to the "Auto Sets" screen and with the RUN/PROG switch in PROG hit the "CONFIGURE" softkey. After typing the configuration code, we press the "CONFIGURE SLIDE" softkey.

Since the slide adjust system is wired in at "SS1", if the slot reported on the screen in not already "AS1", we hit the "NEXT SLIDE SLOT" softkey until it is. The hardware detected should be "Rotary Transducer".

The first thing we must configure is the "Name" of the system. The cursor should already be on the "Name" line so we check to see if the name is already "Slide Adjust #1". If not, the "CHANGE NAME" softkey allows us to cycle through the systems.

During initial slide setup, the "Mode" of the slide needs to be set to "OFF". Moving the editing cursor to the mode parameter, we hit the "CHANGE MODE" softkey until the mode reads "OFF".

Before we set anything further, we need to choose the units for the slide system. Moving the editing cursor to the "Shut Height Units" parameter, we use the "CHANGE UNIT" softkey to set the units to inches for this example. Note that this sets the units for all other shut height position or distance parameters on this screen and during calibration. After calibration, the units can be changed, if desired.

The "Upper Limit" and "Lower Limit" we set to 16.000 inches and 12.500 inches respectively. When the mode if the system is "OFF", these limits are not enforced. This allows us to check the operation of the mechanical limit switches.

The "Tolerance", "Pulse Distance", "Pulse Time", and "Lock Time" are left at .004, .010, .03, and 0 respectively - the default values. We may find these have to be changed later on.

Before calibrating the slide, we MUST make sure the slide is properly counterbalanced, if a counterbalance is used on our press. If the slide is not properly counterbalanced, the slide calibration will be flawed because clearances will not be taken up by the counterbalance.

Now we press the "CALIBRATE SLIDE" softkey to perform the actual slide calibration as described in section 4.2.2.2. We need to know the resolver turns (100) for calibration.

After calibration, the "Present Position" field in the slide configuration screen should display the number we just entered for the lower calibration point. In this example, assume we had entered 14.074 inches for our lower calibration point.

Now we take the press back to the top of the stroke. With the slide adjust switch on, "JOG UP" and "JOG DOWN" softkeys should be displayed in the slide configuration screen.

Using the jog keys, we raise the slide to verify that the upper mechanical limit switch works correctly. Be **very careful** as the slide approaches the true maximum shut height (16.000 inches in this example) as the upper limit switch may be inoperative or misadjusted. Replace or adjust the limit switch as necessary.

In the same way, we verify that the lower mechanical limit switch works correctly. Again for emphasis, be **very careful** as the slide approaches the true minimum shut height (12.500 inches in this example) as the lower limit switch may be inoperative or misadjusted. Replace or adjust the limit switch as necessary.

If desired, the "Upper Limit" and "Lower Limit" can be set to be more restrictive than the actual minimum and maximum shut heights. For rotary transducers, the upper and lower limits should **never** be set outside the actual minimum and maximum shut heights.

Next we go to the "Mode" line of the system and turn it "ON" by cycling through the choices with the "CHANGE MODE" softkey.

The last thing we must do is verify that the "Pulse Distance" and "Pulse Time" settings work for our press. These settings affect how automatic adjustment works. We hit "Exit" twice to return to the "Auto Sets" screen and hit the "RESET ERROR" softkey, if necessary, to clear errors in the slide adjust system. The slide setpoint should also be set to some reasonable value. In this example, the slide should still be at our calibration point of 14.074 inches. We set the slide setpoint to 14.000 inches.

After clearing errors, if present, we go back to the slide configuration screen. With the slide adjust switch on, we should see "JOG UP", JOG DOWN", and "AUTO ADJUST" softkeys. Again we check to make sure the slide is properly counterbalanced. If it is not then the following tests will be meaningless. An under or over counterbalanced slide will not move the same way that a properly counterbalanced slide will.

For fine adjustment purposes, a momentary push of the "JOG UP" or "JOG DOWN" key will "pulse" the slide motor starter for "Pulse Time" seconds. We hit a jog key to see how far the slide moves with one pulse. Ideally, it should take around 2 pulses to move .001 inch. We hit the "JOG DOWN" key and find that it takes 5 pulses to move the slide .001 inch - too many. We change the "Pulse Time" value to

".04" sec. Repeating the test, we find that it now takes 1 to 2 pulses to move .001 inch - an acceptable value.

Now it is time to hit the "AUTO ADJUST" softkey. The slide moves up past 14.000 (the slide setpoint we entered in the operation screen) and stops momentarily at 14.025. It then comes back down and stops at 13.996. The "Pulse Distance" value is set too high. What should have happened is that the slide would go over 14.000, come back down to a position just over 14.000 - say 14.003 - and then pulse into position at 14.000. Since we went under our setpoint by .004 inches, we change the "Pulse Distance" to .017 inches (adding .004 for the undershoot plus .003 for good measure to the original value of .010). Now when we hit the "AUTO ADJUST" softkey the slide travels first to 14.039, stops momentarily, travels down to 14.003, and pulses the slide into position at 14.000 - perfect.

See section 5.1 for further details on slide adjust operation.

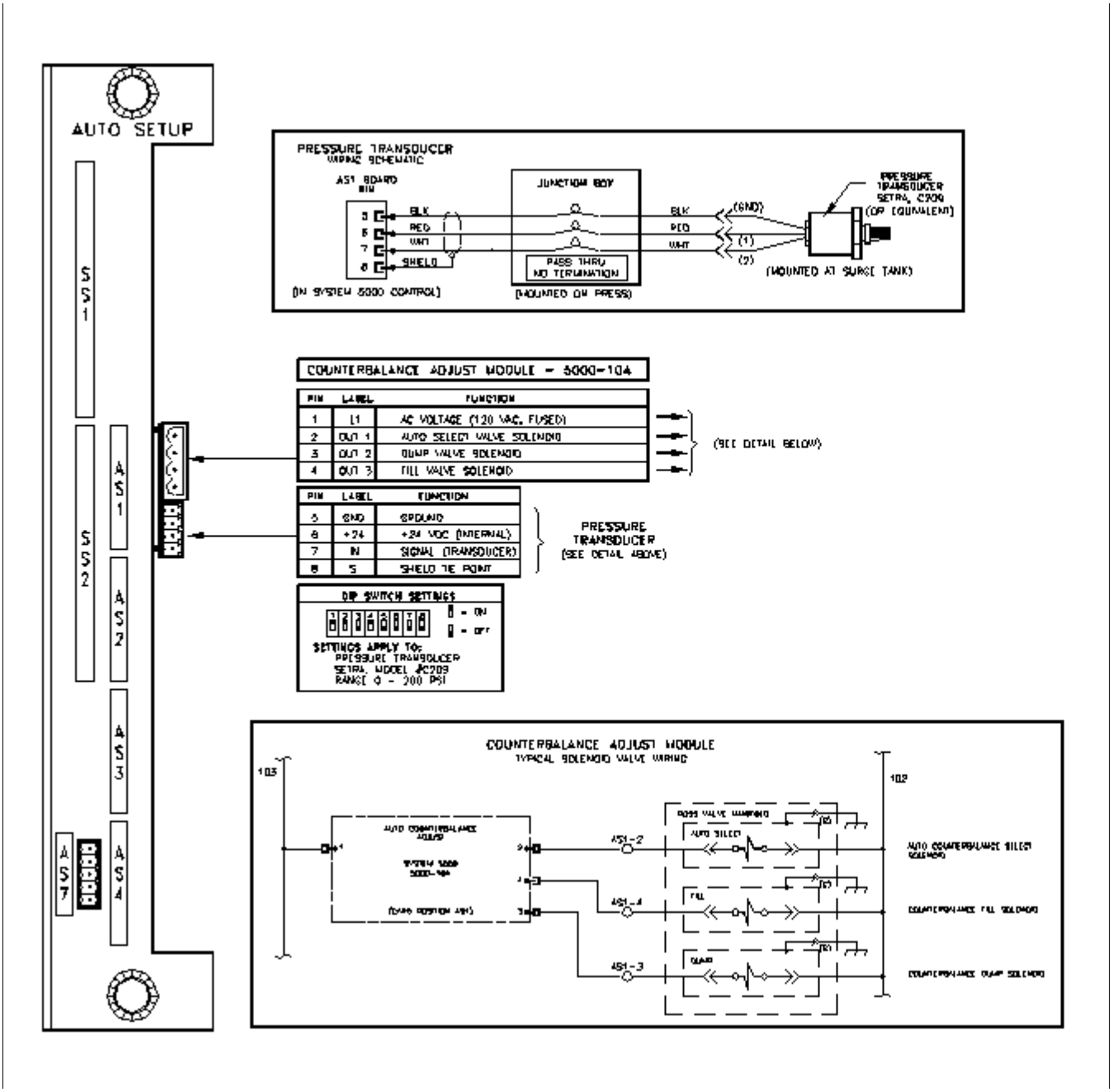


Figure B.1: Typical Counterbalance Wiring Diagram.

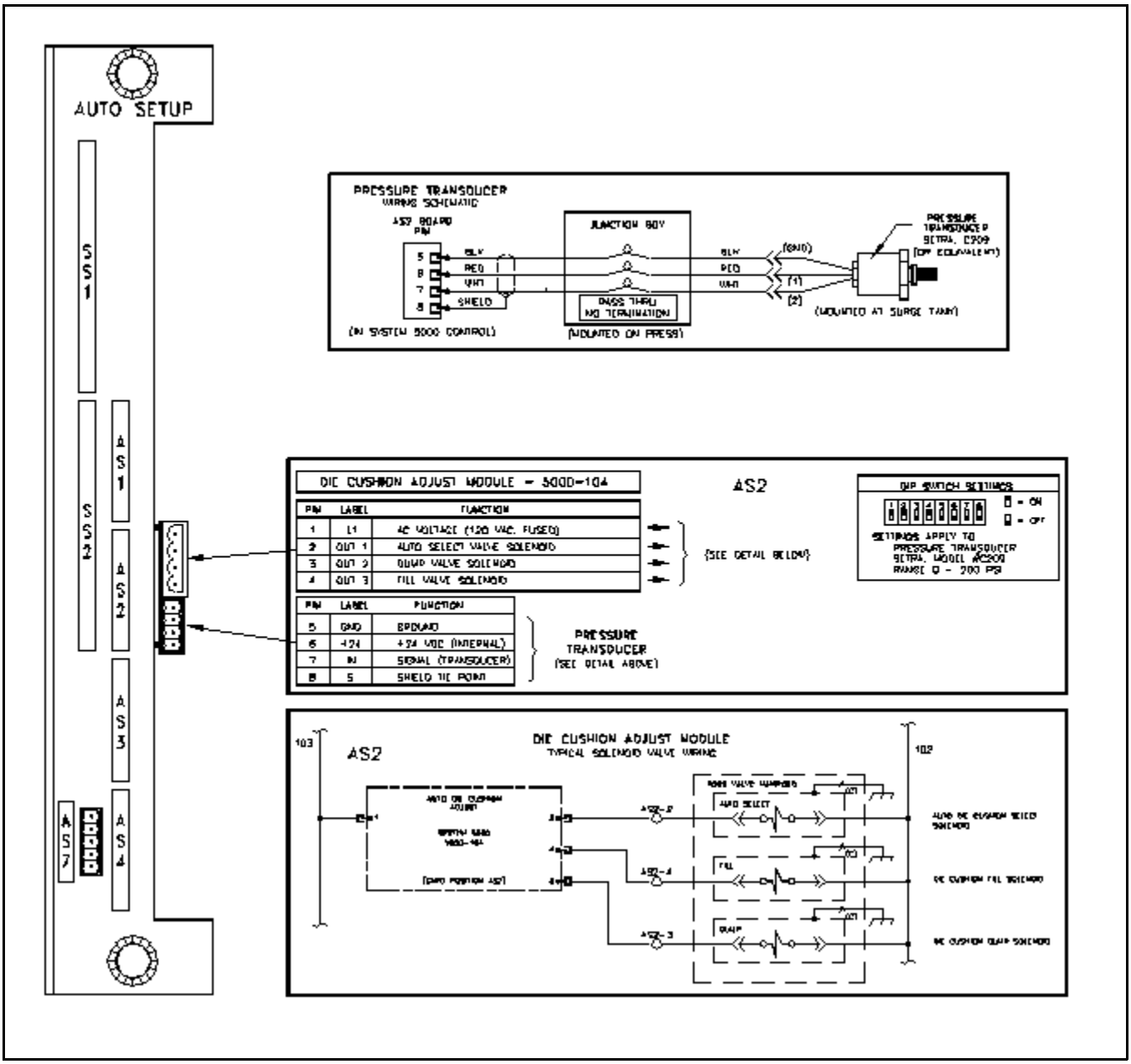


Figure B.2: Typical Cushion Wiring Diagram.

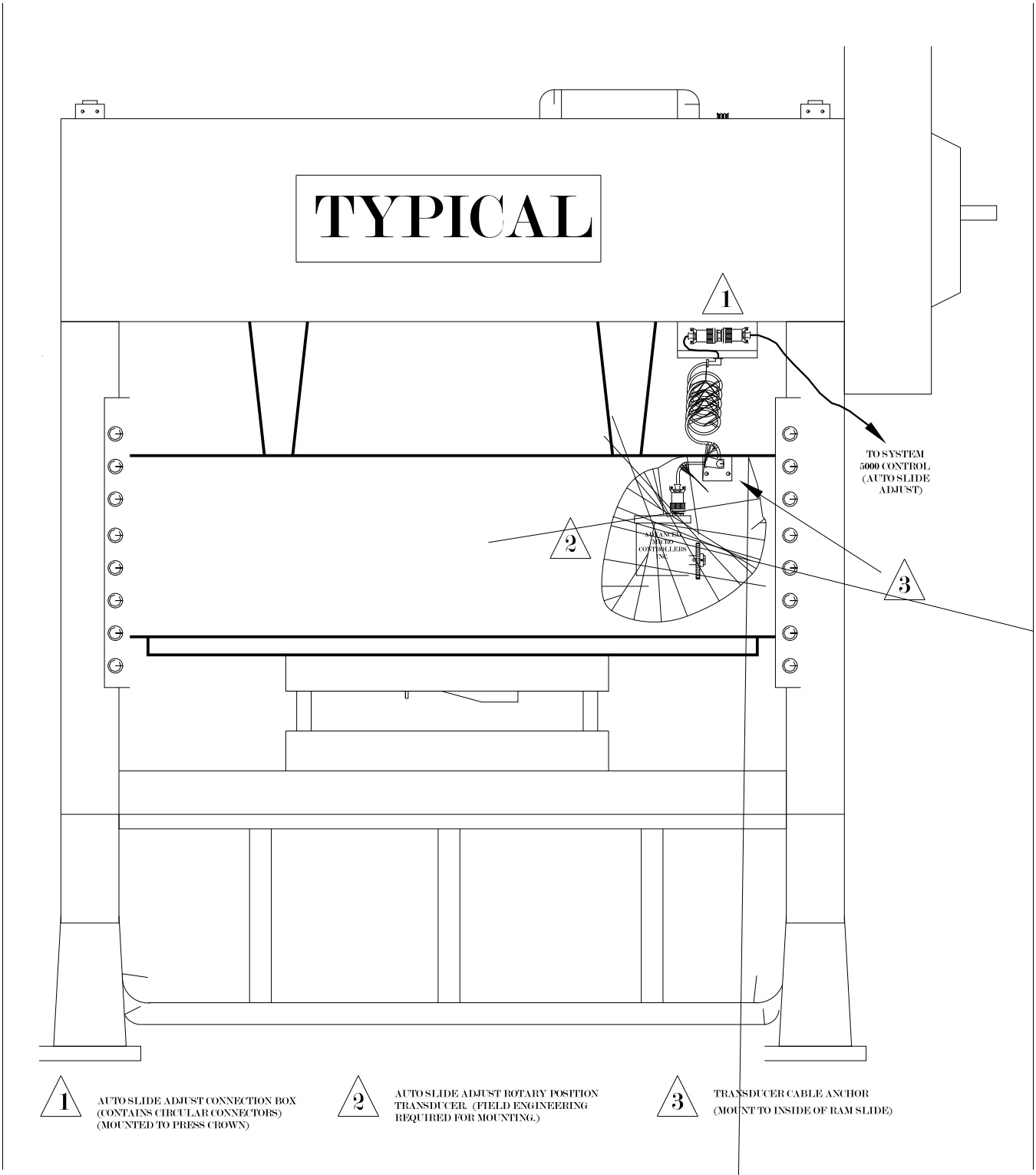

TYPICAL
1
2
3
TO SYSTEM
5000 CONTROL
(AUTO SLIDE
ADJUST)
1 AUTO SLIDE ADJUST CONNECTION BOX (CONTAINS CIRCULAR CONNECTORS) (MOUNTED TO PRESS CROWN)
2 AUTO SLIDE ADJUST ROTARY POSITION TRANSDUCER. (FIELD ENGINEERING REQUIRED FOR MOUNTING.)
3 TRANSDUCER CABLE ANCHOR (MOUNT TO INSIDE OF RAM SLIDE)

Figure B.3: Conceptual Dual Resolver Mounting.

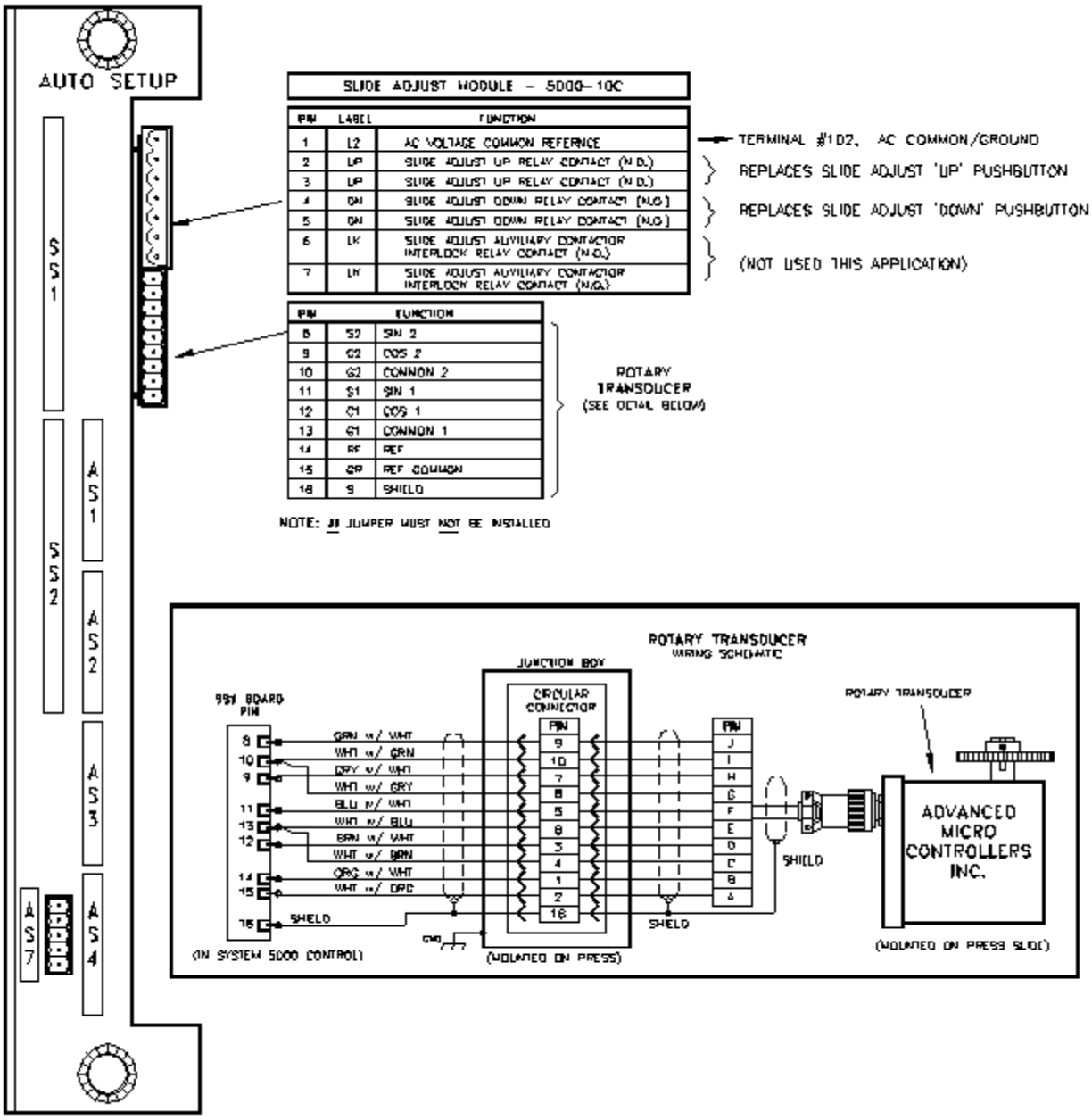

AUTO SETUP
SS1
SS2
AS1
AS2
AS3
AS4
AS7
SLIDE ADJUST MODULE – 5000–10C
PIN | LABEL | FUNCTION
1 | L2 | AC VOLTAGE COMMON REFERNCE
2 | UP | SLIDE ADJUST UP RELAY CONTACT (N.O.)
3 | UP | SLIDE ADJUST UP RELAY CONTACT (N.O.)
4 | DN | SLIDE ADJUST DOWN RELAY CONTACT (N.O.)
5 | DN | SLIDE ADJUST DOWN RELAY CONTACT (N.O.)
6 | LK | SLIDE ADJUST AUXILIARY CONTACTOR INTERLOCK RELAY CONTACT (N.O.)
7 | LK | SLIDE ADJUST AUXILIARY CONTACTOR INTERLOCK RELAY CONTACT (N.O.)
TERMINAL #102, AC COMMON/GROUND
REPLACES SLIDE ADJUST 'UP' PUSHBUTTON
REPLACES SLIDE ADJUST 'DOWN' PUSHBUTTON
(NOT USED THIS APPLICATION)
PIN | FUNCTION
8 | S2 | SIN 2
9 | C2 | COS 2
10 | G2 | COMMON 2
11 | S1 | SIN 1
12 | C1 | COS 1
13 | G1 | COMMON 1
14 | RF | REF
15 | GR | REF COMMON
16 | S | SHIELD
ROTARY TRANSDUCER (SEE DETAIL BELOW)
NOTE: J1 JUMPER MUST NOT BE INSTALLED
ROTARY TRANSDUCER WIRING SCHEMATIC
JUNCTION BOX
CIRCULAR CONNECTOR
9SI BOARD PIN
GRN w/ WHT
WHT w/ GRN
ORG w/ WHT
WHT w/ ORG
BLU w/ WHT
WHT w/ BLU
BRN w/ WHT
WHT w/ BRN
ORG w/ WHT
WHT w/ ORG
SHIELD
(IN SYSTEM 5000 CONTROL)
(MOUNTED ON PRESS)
SHIELD
ROTARY TRANSDUCER
SHIELD
ADVANCED MICRO CONTROLLERS INC.
(MOUNTED ON PRESS SLIDE)

Figure B.4: Typical AMCI Dual Resolver Wiring Diagram.

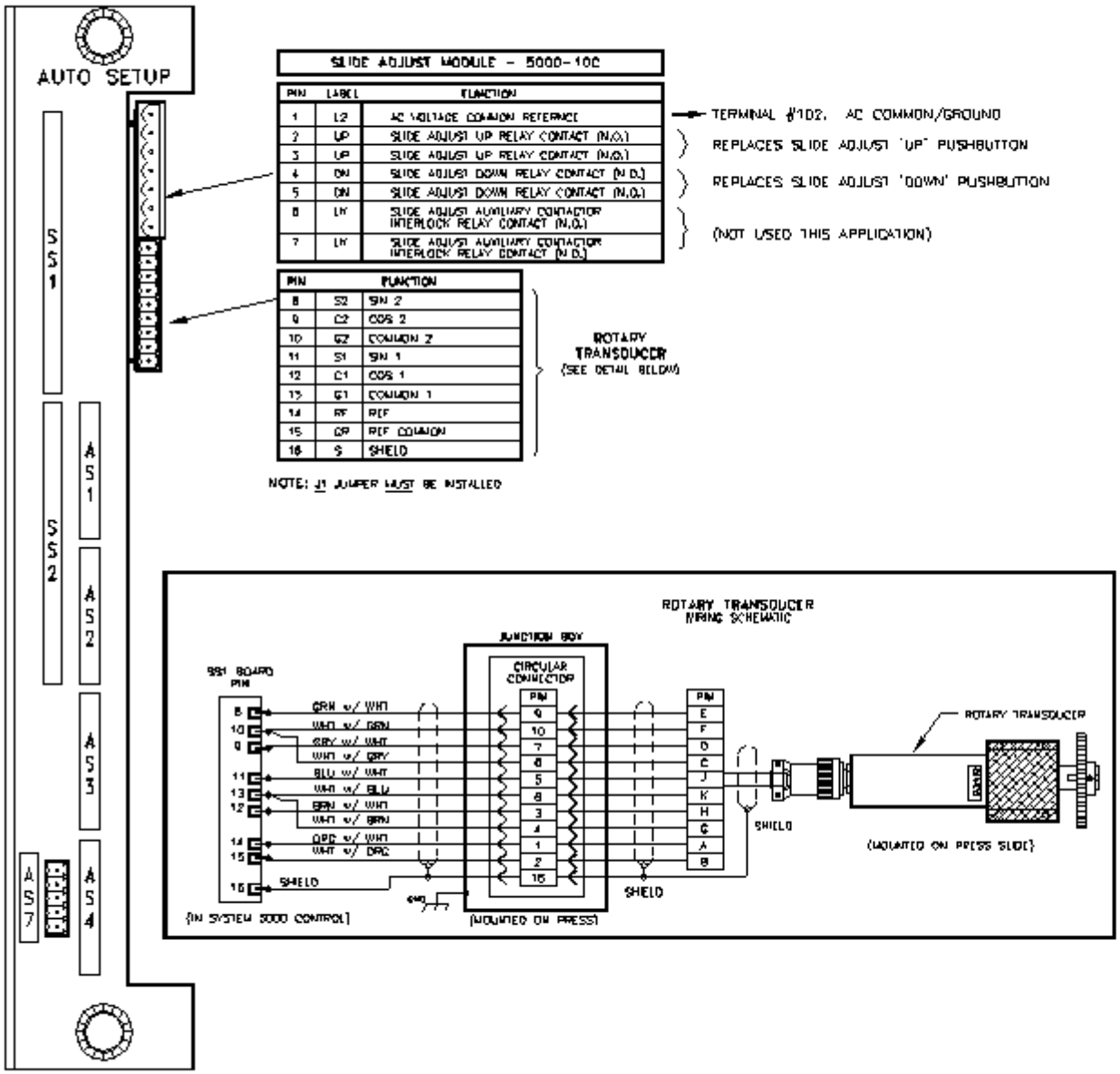


Figure B.5: Typical GEMCO Dual Resolver Wiring Diagram

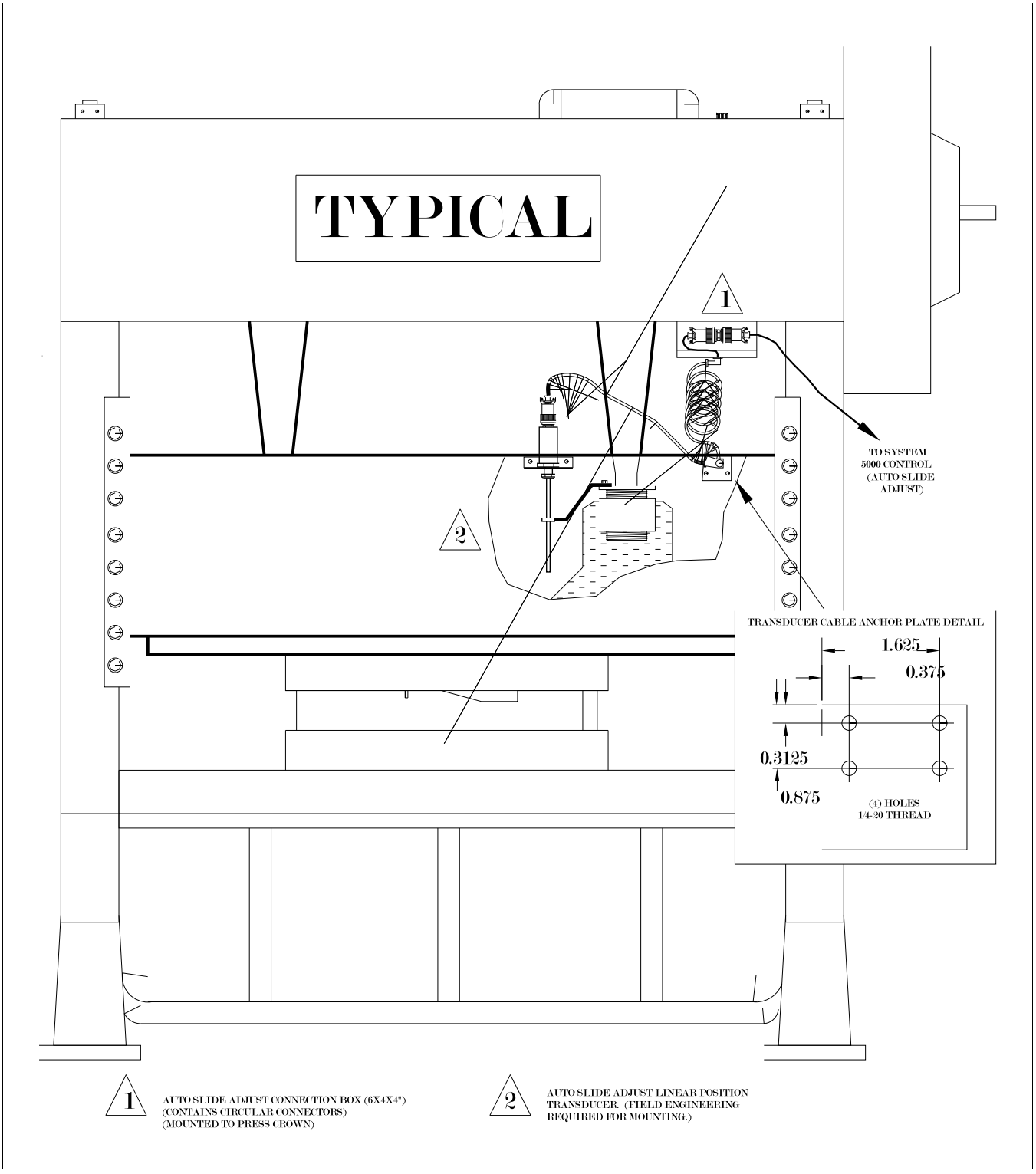


Figure B.6: Conceptual Linear Transducer Mounting

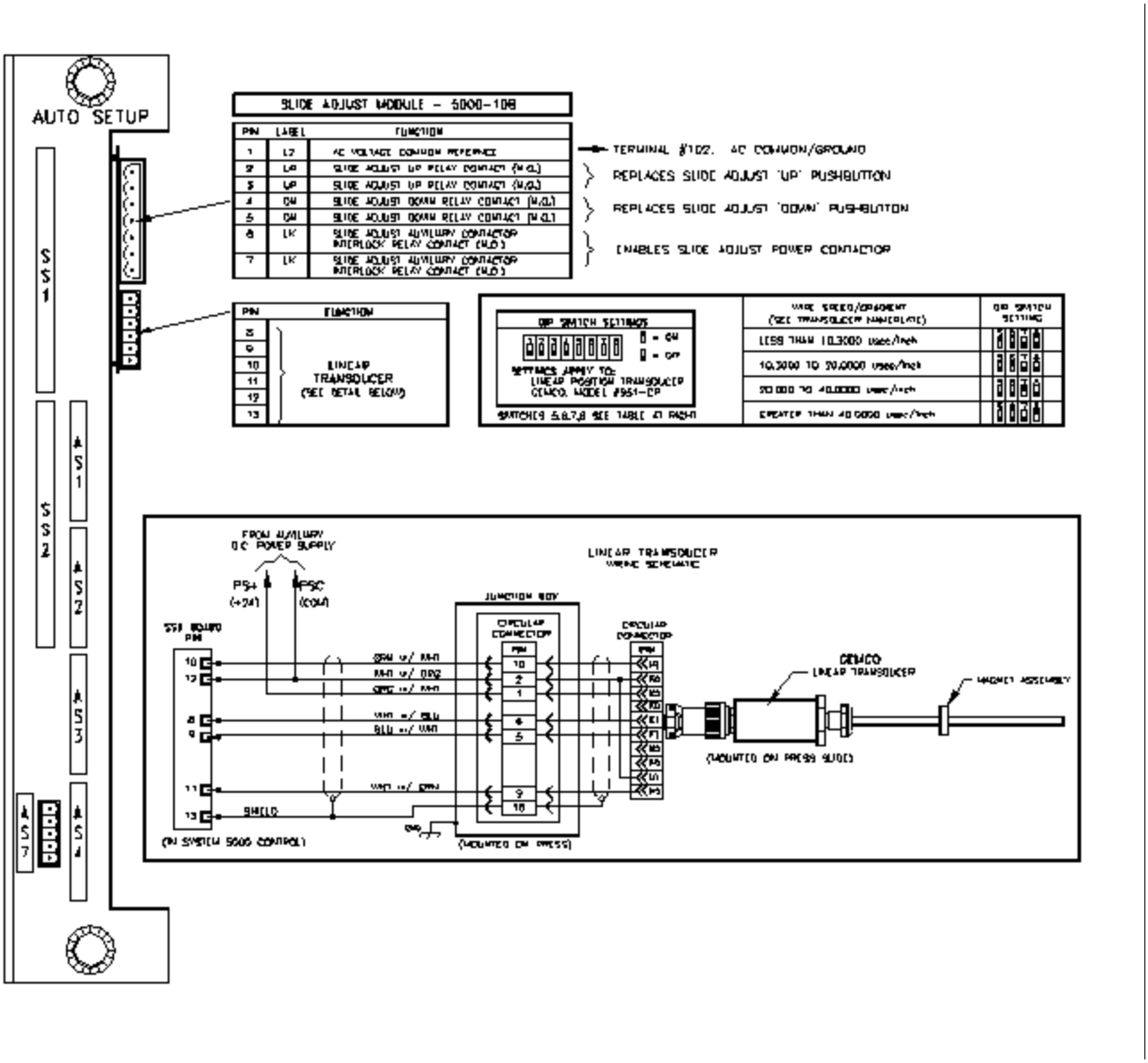


Figure B.7: Typical GEMCO Linear Transducer Wiring

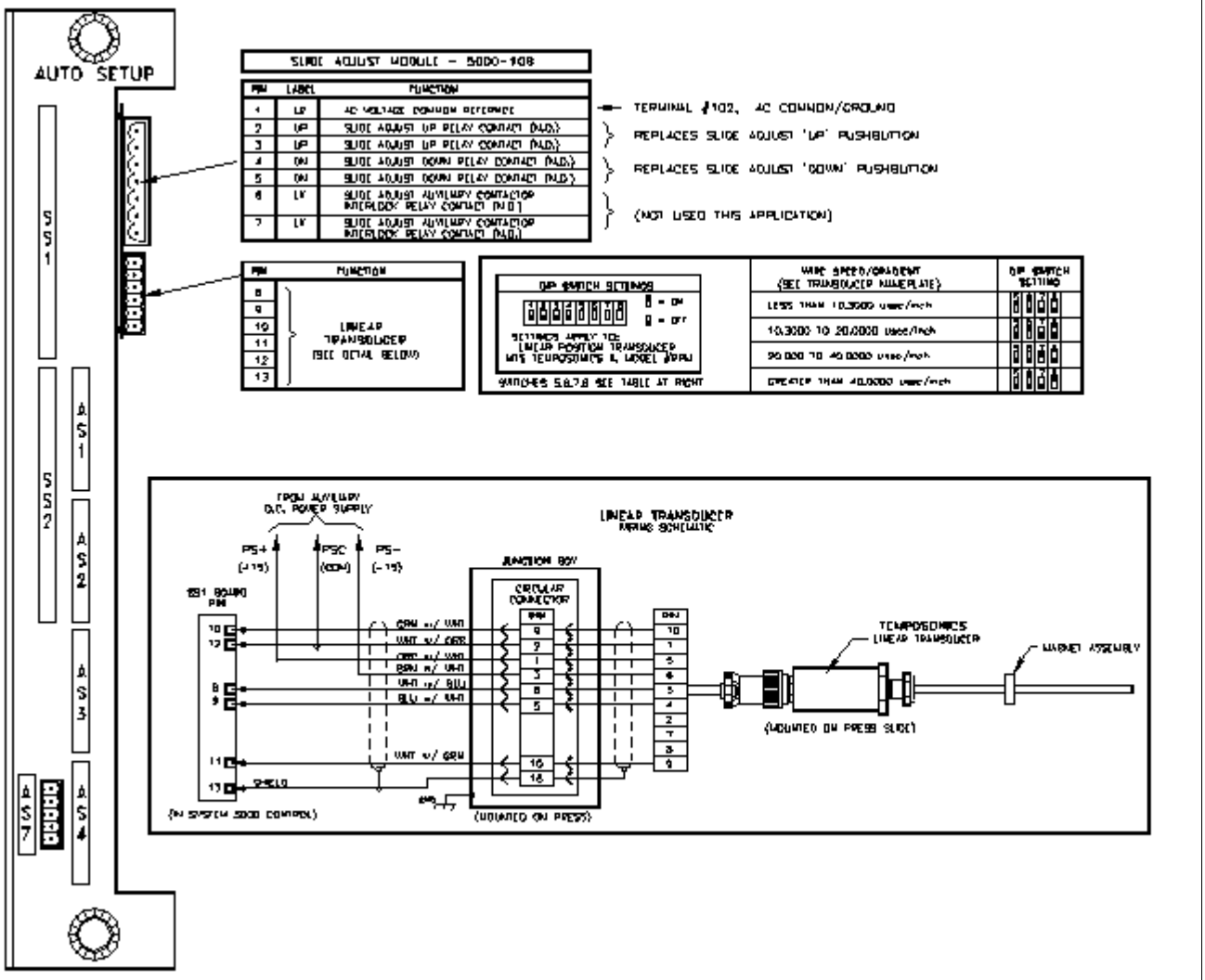


Figure B.8: Typical MTS Temposonics II Linear Transducer Wiring

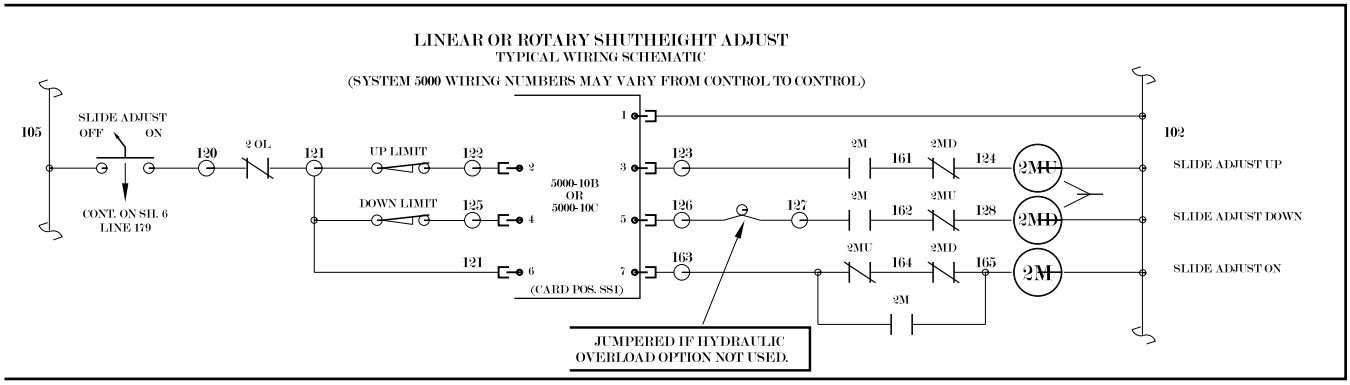


Figure B.9: Typical Slide Motor Starter Wiring With Auxiliary Contactor

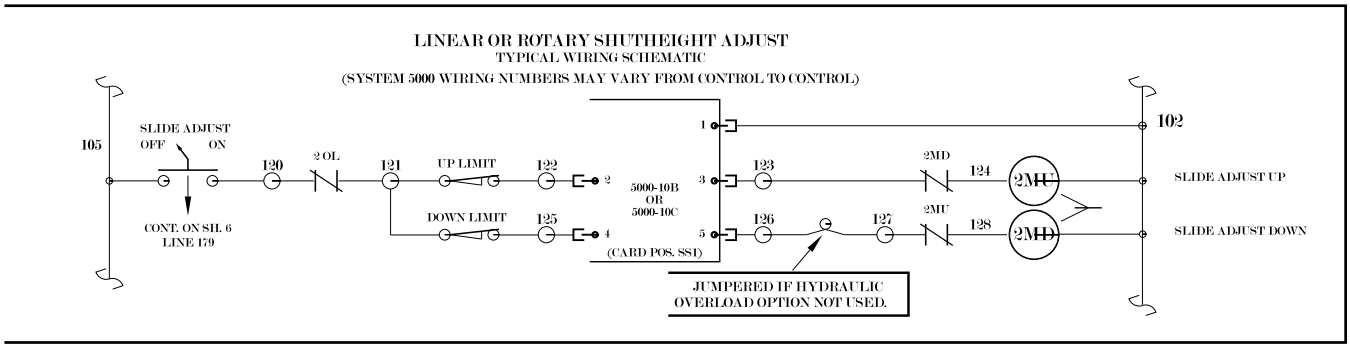


Figure B.10: Typical Slide Motor Starter Wiring Without Auxiliary Contactor

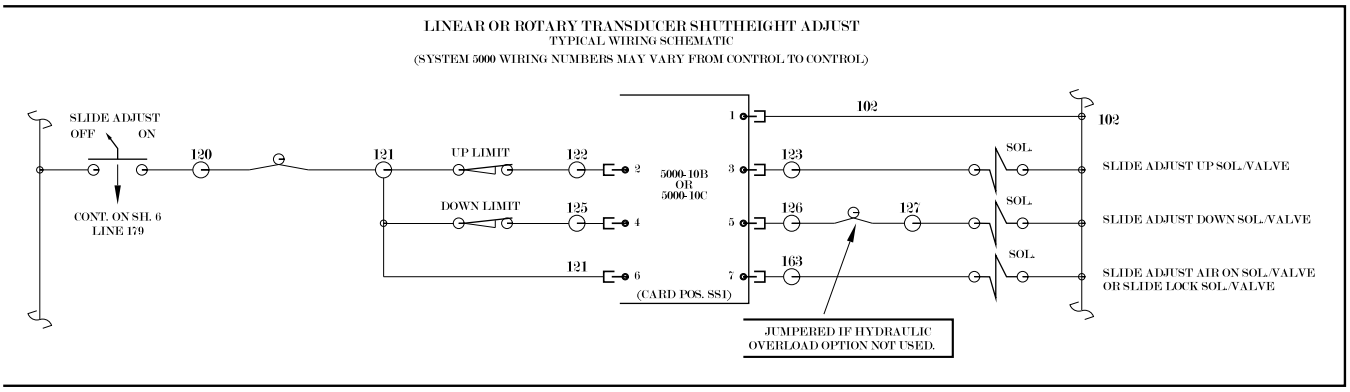


Figure B.11: Typical Slide Air Motor Solenoid Wiring

Appendix C Installation Of OmniLink 5000 Firmware

Firmware for the OmniLink 5000 press control is contained on two integrated circuits. Please follow the instructions listed below for replacing the OmniLink 5000 firmware.

1) Remove all power from the OmniLink 5000 press control. Insure that the power to the OmniLink card rack and the OmniLink Operator Interface terminal has been removed.

2) Remove the logic board from the card rack.

3) Note the location of the notches on integrated circuits 5000-A and 5000-B. Remove integrated circuits 5000-A and 5000-B. See Figure C.1.

4) Insert the new 5000-A and 5000-B integrated circuits. Verify that the notches on the integrated circuits are as shown in Figure C.1.

5) Insert the logic board in the card rack.

6) Apply power to the control and verify operation.

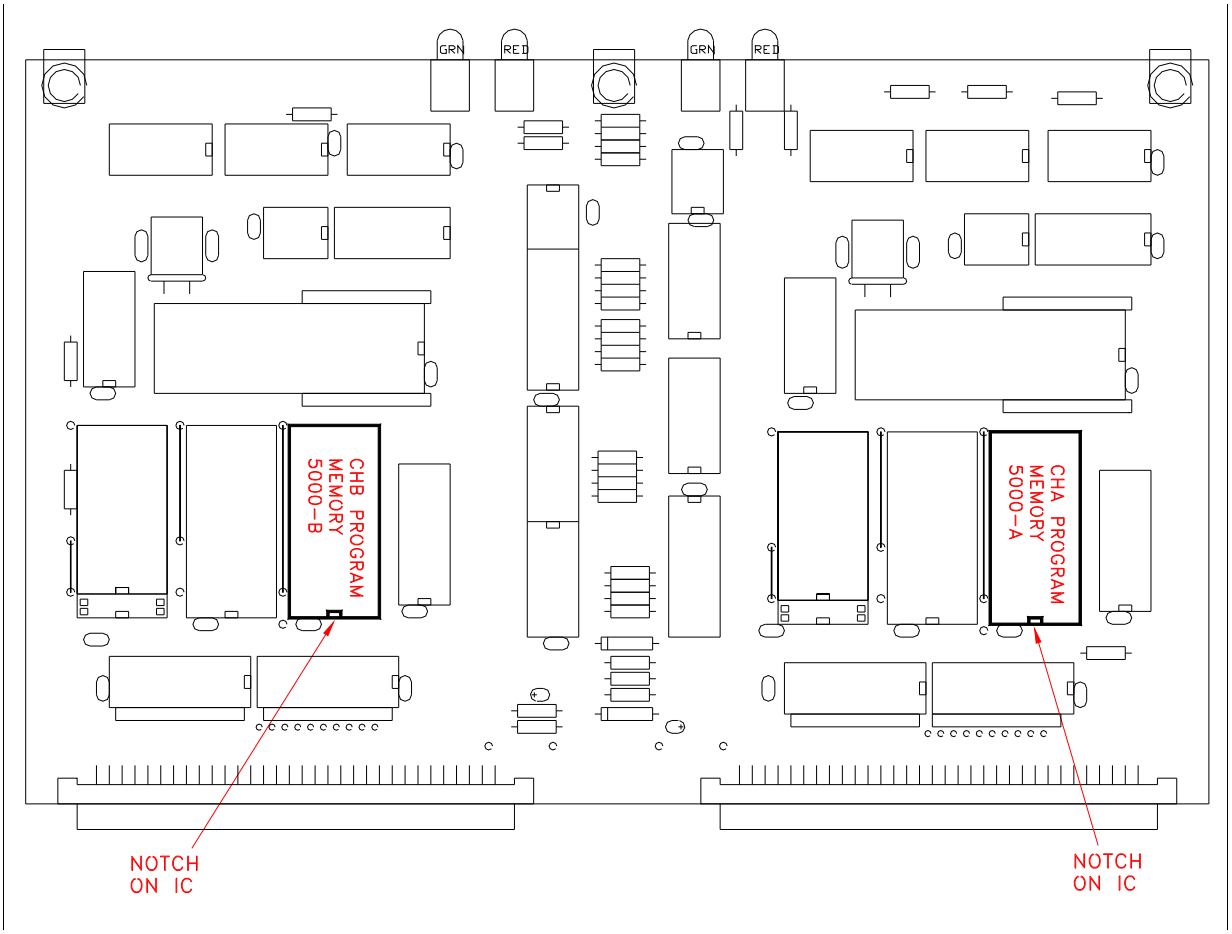


Figure C.1: Logic Module Firmware Chip Locations

Appendix D Lockout Procedure For Air Controlled Systems

Section D.1 General Lockout Considerations

The OmniLink 5000 auto-setup card automatically controls pressures in cushions and counterbalances. Because of this there are special considerations to keep in mind when locking an air system out (at 0 pressure).

Note that cushions can be vented to zero pressure and the press will be allowed to run. A counterbalance that has been vented to zero pressure, however, is considered a stop condition by the press control.

While a type "A" valve has only integrated Fill/Dump valves, the type "B", and "C" integrated air valves (See Section 3.1 for a discussion of valve types) that Link uses to control air pressure on cushions and counterbalances has a manual as well as an automatic section. The manual section for these valves looks like a typical manual air pressure control with a regulator followed by a check valve. There is a pressure gauge ("G1") after the regulator but *before* the check valve, and a gauge ("G2") at the output air port *after* the check valve. When raising the pressure by turning the manual regulator "up" the pressure forces the check valve open and gauge "G1" will be approximately equal to gauge "G2". However when lowering the pressure at the manual regulator, the check valve will prevent the actual output pressure from going down (assuming there are no leaks). A LOX valve on the output is used to blow down the system to lower the pressure. In either case, gauge "G2" shows the true pressure in the counterbalance or cushion.

The automatic section of type "B" and "C" valves (and the only section of type "A" valves) consists of a fill valve and a dump valve. A transducer mounted on the counterbalance surge tank or cushion electronically reports the pressure of the system to the auto-setup board. If the pressure is too low the fill valve puts more air in the system. If the pressure is too high the dump valve vents air to atmosphere.

Section D.2 Valve Type "A" Lockout Procedure

To lock out type "A" valves:

1) Set the air pressure setpoint for the system to 0 psi. This will cause the control to open the dump valve and leave it open to vent the system. Note that this valve will be open only as long as the control is powered. If the system is set to 0 pressure, but the control is turned off before the system can blow down, it will still be pressurized.

2) Use a LOX valve, if present, to dump the air system.

Note!	**Step 1 *MUST* be done even if a LOX valve is opened in step 2 since the control may try to pressurize the system using the Fill/Dump valve if the power is on!**

Section D.3 Valve Type "B" Lockout Procedure

The type "B" valve has a manual regulator in parallel with the automatic section that prevents the pressure it is controlling from going below a minimum. To lock this valve out:

1) Set the pressure setpoint for the air system to 0 psi. At this point the manual regulator will try to fill the system while the automatic section tries to dump.

2) Use the LOX valve (integrated into this type of valve) to dump the system and lock out the manual section.

Note!	**Step 1 *MUST* be done even if a LOX valve is opened in step 2 since the control may try to pressurize the system using the Fill/Dump valve if the power is on!**

Section D.4 Valve Type "C" Lockout Procedure

When power is removed from the control or if the air system is turned OFF in the configuration menu, a type "C" valve will revert to the manual section and the pressure will be no lower than the regulator *but may be higher* because of the check valve.

To lock out a type "C" valve:

1) The air setpoint for the system to be locked out should be set to 0 psi OR the system must be turned OFF in the configuration menu.

2) Use the LOX valve (integrated into this type of valve) to dump the system ***even if the pressure setpoint is set to 0 psi at the control.*** This is necessary because if the control is powered down intentionally or unintentionally the valve will revert to the manual regulator setting and may attempt to fill the air system again.

Note!	**Step 1 *MUST* be done even if a LOX valve is opened in step 2 since the control may try to pressurize the system using the Fill/Dump valve if the power is on!**

If the LOX valve is opened when the system is still turned on and the pressure setpoint is not 0 psi, the system will think it has a leak and will attempt to fill so it is important to turn the system OFF in the configuration menu or set the pressure setpoint to 0 psi *before* the LOX valve is opened.

Appendix E Configuration Sheets

Section E.1 Air System Calibration Sheets

Air Pressure
Configuration

Air Pressure Configuration	Slot #1
Board	_____
Name	_____
Transducer Type	_____
Max. Pressure	_____
Min. Pressure	_____
Max. Force	_____
Min. Force	_____
Fault Time	_____
Tolerance	_____

Air Pressure
Configuration

Air Pressure Configuration	Slot #2
Board	_____
Name	_____
Transducer Type	_____
Max. Pressure	_____
Min. Pressure	_____
Max. Force	_____
Min. Force	_____
Fault Time	_____
Tolerance	_____

Air Pressure
Configuration

Air Pressure Configuration	Slot #3
Board	_____
Name	_____
Transducer Type	_____
Max. Pressure	_____
Min. Pressure	_____
Max. Force	_____
Min. Force	_____
Fault Time	_____
Tolerance	_____

Air Pressure
Configuration

Air Pressure Configuration	Slot #4
Board	
Name	
Transducer Type	
Max. Pressure	
Min. Pressure	
Max. Force	
Min. Force	
Fault Time	
Tolerance	

Air Pressure
Configuration

Air Pressure Configuration	Slot #7
Board	0-10 Volt Out
Name	
Transducer Type	
Valve Type	
Max. Pressure	
Min. Pressure	
Max. Force	
Min. Force	
Fault Time	
Tolerance	

Section E.2 Shut height Calibration Sheets

Linear Transducer
Slide Configuration

Slide Configuration	Slot #1
Board	Linear Transducer
Name	_____
Wire Speed	_____
Upper Limit	_____
Lower Limit	_____
Tolerance	_____
Pulse Distance	_____
Pulse Time	_____
Lock Time	_____
Orientation	_____

Linear Transducer
Slide Configuration

Slide Configuration	Slot #2
Board	Linear Transducer
Name	_____
Wire Speed	_____
Upper Limit	_____
Lower Limit	_____
Tolerance	_____
Pulse Distance	_____
Pulse Time	_____
Lock Time	_____
Orientation	_____

Rotary Transducer
Slide Configuration

Slide Configuration	Slot #1
Board	Rotary Transducer
Name	_____
Upper Limit	_____
Lower Limit	_____
Tolerance	_____
Pulse Distance	_____
Pulse Time	_____
Lock Time	_____
Resolver Turns	_____

Rotary Transducer
Slide Configuration

Slide Configuration	Slot #2
Board	Rotary Transducer
Name	_____
Upper Limit	_____
Lower Limit	_____
Tolerance	_____
Pulse Distance	_____
Pulse Time	_____
Lock Time	_____
Resolver Turns	_____

Appendix F Specifications

Section F.1 5000-10A Pressure Control Board

AC Output Relays:	Voltage:	120VAC
	Current:	1Amp Continuous
		20 Amp 16ms
		5 Amp 75ms
	Fuse:	2 Amp Fast-Blow Picofuse

Section F.2 5000-10B Linear Shut Height Control Board

AC Output Relays:	Voltage:	120VAC
	Current:	1Amp Continuous
		20 Amp 16ms
		5 Amp 75ms
	Fuse:	2 Amp Fast-Blow Picofuse

Section F.3 5000-10C Rotary Shut Height Control Board

AC Output Relays:	Voltage:	120VAC
	Current:	1Amp Continuous
		20 Amp 16ms
		5 Amp 75ms
	Fuse:	2 Amp Fast-Blow Picofuse